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Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

In this issue—

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- Stern Trawling Unit — P.1
- Black Spot in Shrimp — P.3
- Food Additive Laws — P.5
- Mineral Flotation — P.11
- Seaweed for Food — P.13

— and 31 others

Vol. 13 No. 3 **March 1960**

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U. S. Department of the Interior
Washington D. C.

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FRED A. SEATON, SECRETARY

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ARNIE J. SUOMELA, COMMISSIONER

Commercial Fisheries Abstracts

DIVISION OF INDUSTRIAL RESEARCH AND SERVICES
BUREAU OF COMMERCIAL FISHERIES

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0 General and theoretical
1 Fish by species
2 Fresh fish
3 Preserved fish
4 Oils
5 Vitamins
6 Fishery byproducts
7 Analytical Methods
8 Composition
9 Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.32 TWO HAEMOGLOBINS IN CHUM SALMON

Hashimoto, K. and Matsuura, F. (University of Tokyo, Tokyo, Japan)
Nature 184, 1418 (October 31, 1959)

Introduction. -- Multiple haemoglobins occur in fish as well as in other vertebrates. The authors found by the use of starch zone electrophoresis that a haemolyzate of blood haemoglobin from chum salmon, Oncorhynchus keta, contained fair amounts of two or more components of blood haemoglobin. In the physiological pH region, a fast-migrating component designated as component F was more labile to heat denaturation, less soluble in concentrated salt solution, and less anionic in electrophoresis than a slow-migrating component designated as component S. These two components showed further differences in column chromatographic and absorption spectra in the Soret region. In the present report, the authors discuss crystallization and other properties of components F and S.

Experimental. --Haemolyzate from chum salmon blood that had been saturated with carbon monoxide was made 0.35 saturated with ammonium sulphate at a neutral pH and then filtered. Salt was added to the filtrate until it became 0.6 saturated. Component F and other compounds were precipitated by this treatment. These compounds were collected and dissolved in distilled water. The resulting solution was made slightly turbid by adding ammonium sulphate at pH 6.8 to 6.9. After the turbid solution had been held overnight in a cold place, trapezoidal or square-shaped crystals of component F appeared in the solution. Clusters of needle-shaped crystals of component S were crystallized from the filtrate of the solution at pH 6.3 by a similar procedure. Crystallization of component S, however, required 2 to 3 days.

Each component was recrystallized twice. They then were found to be practically homogeneous in moving boundary electrophoresis. Each component also was analyzed for sedimentation and diffusion constants in 0.1 M phosphate buffer. The molecular weight and the frictional ratio were calculated by assuming a partial specific volume of 0.750 for this protein. All values are reported in

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 ABSTRACTER: Martin Heerdt

0.7 DIETARY PROTEIN REQUIREMENTS AND PROBLEMS OF SUPPLEMENTATION

Allison, James B.; Wannemacher, R. W., Jr.; Middleton, E.; and Spoerlein, T. (The State University, New Brunswick, New Jersey)
Food Technology 13, 597-602 (November 1959)

Protein requirements of man and problems involving supplementation are discussed in this article. The need for supplying the body with adequate nitrogen for growth and maintenance is emphasized. The indispensable amino acids must be sufficient and in proper proportion for cellular protein synthesis.

Dietary proteins that have a poor pattern of amino acids must be fed in higher concentrations than those that have a better pattern, if similar responses in growth are to be produced. If the pattern of amino acids in a diet deviates too much from optimum, feeding more of the diet to overcome a deficiency does not result in the development of a normal body. If a protein has a "biological value" (fraction of absorbed nitrogen retained in the body for protein synthesis) of less than 60, the pattern of amino acid in the diet probably should be improved.

The authors determined the nutritive value of the protein in several test foods. Each food was integrated into a control diet. Foods fed to rats alone and in varying combinations included: egg, high protein flour, defatted wheat germ, wheat gluten, casein, semolina, and cottonseed meal. The effects of supplementing these foods with meat or cheese sauces were also tested. Results were measured by gain in body weight, albumin to globulin ratio, and total liver protein. All of these measurements of performance were affected by differences in the levels and adequacy of the protein in the diet. The results illustrate the importance of improving both nutritive value and quantity of dietary protein in order to meet the needs for tissue protein synthesis.

The authors estimated the average intake to be recommended for individuals eating a mixed American diet. The "biological value" of the average American diet is probably about 70. The average recommended intake was calculated as about 0.9 gram of protein per day per kilogram of body weight.

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 ABSTRACTER: Neva L. Karrick

0.5 NUTRITION AND METABOLISM OF MARINE BACTERIA VII. GROWTH RESPONSE OF A MARINE FLAVOBACTERIUM TO SURFACE ACTIVE AGENTS AND NUCLEOTIDES

MacLeod, Robert A.; Hogenkamp, H.; and Onofrey, E. (Fisheries Research Board of Canada, Technological Station, Vancouver, B. C.)
Journal of Bacteriology 75, 460-466 (April 1958)
Studies 1958, from the Stations of the Fisheries Research Board of Canada, FRB 521 (1959) (Ottawa)

Introduction. --In the course of a study of the nutritional requirements of a number of marine bacteria, a bacteria was found that failed to grow unless a supplement of yeast extract or other natural materials was added to the medium (MacLeod et al. 1954). A chemically defined medium suitable for the growth of this organism has now been obtained. In a medium containing 18 amino acids and 2 vitamins, the growth-promoting effect of yeast extract could be largely, but not completely, replaced by a mixture of a surface active agent and 3 nucleotides.

Results. -- A marine organism of the genus Flavobacterium that grew very slowly in a chemically defined medium, unless yeast extract or other natural materials were added, responded almost as well to a combination of a surface active agent and three nucleotides as to yeast extract.

The authors concluded that the surface active compounds promoted growth because of their surface active properties rather than for their ability to serve either as precursors of cell lipids or as sources of fatty acids.

Adenylic, guanylic, and either uridylic or cytidylic acids, when added to the medium as a combination of three acids, stimulated growth of the Flavobacterium; whereas any one or combination of

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 Reprinted in part

2.115 A NEW STERN TRAWLING UNIT

Anonymous
Canadian Fisherman 46, 13 (November 1959)

A new stern trawling unit features (1) a unique bipod mast, (2) twin rotating cranes, and (3) flush steel deck covers. As a result of using the new trawling unit, the designers claim that the speed of bringing the trawl on board has been increased, trawl damage has been reduced, and more deck space has been made available.

Commander J. C. E. Cardosa of the Portuguese Naval Constructor Corps presented a paper at the recent meeting of the Institution of Naval Architects in Lisbon, in which he presented a solution to the problem of controlling the operations of fishing over the stern of the boat.

An integral part of the set-up is a large, steel, folding, flush hatchcover in a frame that forms a movable ramp to permit the fish to slide easily to the 'tween decks without being crushed or bruised.

The objectives of the designers were to increase the speed of bringing the trawl on board; to reduce damage to the trawl; to ensure that the quality of the catch is not impaired; and to improve the working conditions for the crew. These objectives were reached by maintaining a normal form aft, by the vertical lift to the trawl, and by the arrangements made to get the catch down to the working 'tween decks.

The crew is reported to work better under conditions of increased safety and to be able to handle the trawl more rapidly. The net result is said to be increased output with a smaller crew.

See illustration, over.

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 ABSTRACTER: Kathryn L. Osterhaug

0.5

any two of these acids, when added to the medium, reduced the rate of growth of the organism. Uridylic acid could be replaced in the mixture by uridine, cytidylic acid, or cytidine. Deoxycytidine and thymidine, though less effective, had some growth-promoting activity. The free pyrimidine bases did not promote growth. Guanylic acid could be replaced equally well by guanosine or deoxyguanosine but not by guanine in the combination. Adenylic acid and adenosine could be used interchangeably, but adenylic acid and adenine could not. Deoxyadenosine proved to be inhibitory to growth.

Conclusions.--The authors concluded that guanosine and deoxyguanosine and possibly other ribosides and their corresponding deoxy compounds are interconvertible by this organism. The flavobacterium also was found to require biotin, thiamin, a complex mixture of amino acids, Na^{+}, K^{+}, Mg^{++}, and Ca^{++} for growth.

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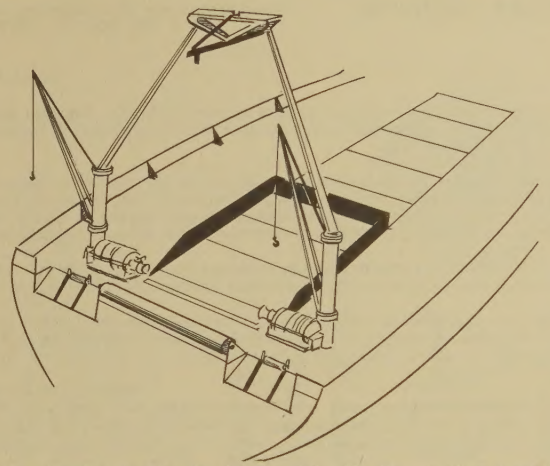

A line drawing showing the details of the MacGregor stern trawling unit. Note the shroudless bipod mast and the position of the twin rotating cranes at either side of the vessel.

0.32

table 1 (below). The sedimentation and diffusion constants and the frictional ratio of component F are in agreement with those values reported for vertebrate haemoglobins. The axial ratio of component S is more than double that of component F, namely, S 10.2, F 4.6 (as prolate) or 12.8, F 4.8 (as oblate); therefore, the components do not have the same molecular shape.

Both preparations were isolated from the haemolyzate by starch block zone-electrophoresis, and their oxygen dissociation was measured in phosphate buffers in the pH range 7.75 to 6.6. A decrease in the pH of a solution of component F from pH 7.75 to 6.6 resulted in such drastic lowering in oxygen affinity that most of the haemoglobin remained reduced even at atmospheric pressure. Conversely, the oxygen affinity of component S was scarcely affected by a similar change in pH.

Table 1.--Some physical properties of two components of blood haemoglobin from chum salmon

	Component F	Component S
Sedimentation constant, S_{20}, w(s)	4.16	3.64
Diffusion constant, D_{20}, w(cm.^{2}/sec.)	6.6 x 10^{-7}	4.9 x 10^{-7}
Molecular weight, Ms, D	61,000	72,000
Frictional ratio, f/fo	1.23	1.56

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An estimate of amino acid requirements must take into consideration the ratio of digestion of the protein and the ratio of absorption of the amino acids. Chemical analysis of the diet does not necessarily give an accurate estimate of the pattern of amino acids presented by the diet to the body. Another important factor to be considered is the total nitrogen required by the body for maintenance and growth and the precentage of this requirement that must be made up of indispensable amino acids.

The data tabulated below show the reference amino acid patterns. Agreement between these patterns is marked and, if substantiated by further data, should serve as a basis for estimating amino acid requirements.

Essential amino acid patterns for maintenance and growth

	Reference patterns		Minimum for nitrogen equilibrium		Growth
	Egg	FAO	Man	Dog	Rat
		(provisional)			
Arginine	1.2				0.8
Histidine	0.5			0.5	0.5
Isoleucine	1.3	1.5	1.3	1.6	1.4
Leucine	1.8	1.7	1.8	2.3	1.9
Lysine	1.5	1.5	1.1	1.5	1.6
Phenylalanine	1.2	1.0	1.2	1.1	1.3
Tyrosine	0.6	1.0	0.7	0.8	0.7
Total aromatic	1.8	2.0	1.9	1.9	2.0
Total sulfur	1.5	1.5	0.7	1.4	1.4
Threonine	1.0	1.0	1.0	1.0	1.0
Tryptophan	0.24	0.5	0.24	0.27	0.21
Valine	1.5	1.5	1.5	1.5	1.7

To obtain minimum requirement for maintenance in man, expressed as milligrams of amino acids per day per kilogram of body weight, multiply values in patterns by 19.5; for maintenance in the dog multiply by 44. To calculate grams of amino acid needed for growth of 50 grams in the rat multiply by 0.44.

0.7 CHANGES IN NUTRITIVE VALUE OF FOOD FATS DURING PROCESSING AND COOKING

Brown, J. B. (Dept. of Physiological Chemistry and Pharmacology, The Ohio State University, Columbus)
Nutrition Reviews 17, 321-325 (November 1959)

The principal visible food fats in the American diet are lard and butter of the animal fats and corn, cottonseed, peanut, and soybean oils of the vegetable fats. Large amounts of cottonseed oil and most of the soybean oil that is used as food fat are hydrogenated and used in formulating shortenings and margarines, which compete with lard and butter.

The only specific contribution of fats to the human diet is their contribution of the essential fatty acids, linoleic and arachidonic. These are polyunsaturated acids, and they are the most sensitive of the fatty acids to oxidation or any other type of chemical change. The best sources of linoleic acid are corn, cottonseed, and soybean oils, which readily oxidize in air, even at ordinary temperatures.

During commercial processing, fats may be exposed to two types of treatment that may seriously alter the fatty acids and the glycerides: (1) exposure to high temperatures with or without oxygen and (2) hydrogenation. These treatments are now under critical observation as possible health hazards.

Temperatures above 250° C. may cause important polymeric changes. Rat-feeding experiments in several laboratories have shown the deleterious effects of thermal polymerization. Thermal polymerization of fats and oils, either with or without oxidation, forms products that seriously impair the nutritive value of the oils and may even be actually toxic. It has been shown that thermal polymerization of fats results in products that either are not absorbed or are actually toxic and that these

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 ABSTRACTER: June H. Olden

2.1476 DRIFT-NETTING FOR HERRING ALONG THE SOUTH COAST OF NEWFOUNDLAND

Tibbo, S. N. (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick)
Progress Reports of the Atlantic Coast Stations, Fisheries Research Board of Canada No. 72, 27-31 (September 1959)

During the 1940's, herring landings in Newfoundland approximated 100 million pounds annually, reaching a peak of 163 million pounds in 1946. Slightly over half these landings were made along the south coast, chiefly in Hermitage, Fortune, and Placentia Bays. Recently, the catches from this area declined rapidly from 20 million pounds in 1953 to 3.5 million in 1956, and, finally, to almost nothing in 1957.

Biological studies in Fortune Bay from 1947 to 1948 showed that commercial herring stocks are made up of many brood classes that average 10.4 to 11.6 years of age. This constitutes evidence of a high rate of survival, therefore, the decrease in landings, assuming that there has been no change in fishing effort, has probably resulted in changes in the availability of fish.

In 1956 to 1957, fishery scientists attempted to discover the whereabouts of these stocks. They used drift-nets at various locations throughout the area in their explorations. They set the nets in the evening and hauled them the following morning. Tows were made with fine mesh nets to determine the abundance of herring food. At each drift net station, water temperatures and weather conditions were noted and the herring samples examined for size and condition.

Results of the experiments disclosed yearly catch differences as well as seasonal variation. Although at times concentrations of herring were found that could be considered adequate for commercial fishing, the author feels that the experiments contributed little towards an understanding of

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 ABSTRACTER: Harold C. Johnson

2.1472 MACKEREL FISHING WITH TROLLING LINES

Kausch, K.
Fischwaid 13, No. 8, p. 140 (Aug. 1958) (In German)
World Fisheries Abstracts 10, 19-20 (May-June 1959)

Mackerel fishing in the W. Baltic is carried out with trolling lines towed by small otter boards (see fig. over). The otter boards keep the lines in lateral position off the boat. These are small wooden boards best made of teak or pine. Their size is 300 x 70 mm. (11-7/8 x 2-3/4 in.), 10 mm. (13/32 in.) thick. On the back, the board is provided with a strip of lead of 4 x 8 x 40 mm. (5/22 x 5/16 x 1-9/16 in.) in size and weighing 38 g. The longitudinal edge of the board is slanted towards the shearing side. At the rear upper edge, there is a small brass screw for fastening the angling line, 7 m. (23 ft.). The board is held with 4 lines made of plaited Perlon or similar material of 1 mm. (1/16 in.) in diameter. The lines are of uneven lengths, so that the point of attachment is 70 mm. above the anterior half and beneath the lower quarter of the board. Monofilament Perlon of 0.4 mm. (1/64 in.) in diameter is used as a snood for the hook. As can be seen, from the figure, 2 snoods of 600 and 400 mm. (23-5/8 and 15-3/4 in.) with one hook each (size 1 or 2) are used. The main line between the boat and the otter board is 30 m. (98 ft.) long and 1 mm. (1/25 in.) thick. Clean pieces of mackerel or herring, with bright skin, cut into fingerlengths by means of sharp scissors, are considered the most suitable bait. No bait may be necessary if a narrow white goose feather is attached beside the hook. When a mackerel has taken the hook, the board rises to the surface and is hauled aboard. In September and October, the mackerel usually stay closer to the bottom. Instead of the otter board, weights are then used. The size of the weights depends on the speed of the boat and this has to be found by experience. Generally speaking, weights of 1 to 1.5 kg. (2.2 to 3.3 lb.) will do.

See illustration, over.

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 ABSTRACTER: A. von Brandt

2.15 INFLUENCE OF VESSEL-HANDLING PRACTICES ON FORMATION OF BLACK SPOT IN SHRIMP

Idyll, Clare P.; Alexander, James; and Lee, Charles F.
Commercial Fisheries Review 21, 10-16 (November 1959)

The appearance of black zones or spots at the edges of the shell segments of shrimp is known as "black spot." The dark color is produced by melanin pigments that form on the internal surfaces of the shell and, in advanced stages, on the underlying shrimp meat. Black spot is produced by an oxidative reaction of tyrosinase on tyrosine, a reaction that is accelerated by copper and other metallic ions.

The accepted theory is that the black spot in shrimp develops as a result of poor handling practices or of prolonged storage of the shrimp in ice. Very little actual work has been done, however, to discover the specific factors that cause the formation of black spot. The purpose of the investigation reported here was to determine whether changes in the way shrimp are handled on the boats could eliminate, or at least reduce, the incidence of black spot. The specific objectives of the research were (1) to observe the commercial practices of handling shrimp on the boats, during storage in ice, and during frozen storage in order to determine what factors may affect black-spot formation, and (2) to suggest modifications in the commercial methods of handling and storing shrimp in ice to reduce black spot formation if handling practices proved to be associated with the formation of black spot.

Experimental.--The following experimental variations were introduced into the methods of handling and storage of shrimp aboard ship and in the laboratory to observe their effect on the incidence of black spot:

1. Length of drag--observations were made of shrimp taken in drags lasting for 2, 3, 4, 5, and 6 hours.
2. Washing shrimp on deck--a comparison was made with shrimp stored in ice without previous washing.

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 ABSTRACTER: Kathryn L. Osterhaug

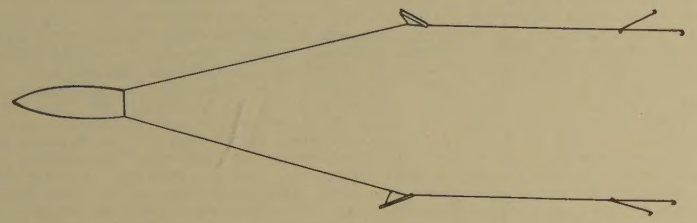
CHANGES IN FOOD FATS

TROLLING FOR MACKEREL

DRIFT NET FOR HERRING

BLACK SPOT IN SHRIMP

2.1472



Mackerel troll lines with otter board

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3. Bruising--some of the shrimp were deliberately bruised on deck, and compared with others of the same lot that were handled carefully.

4. Removal of heads--some shrimp were stored in ice with heads on and compared to others of the same lot from which heads were removed before storage.

5. Delay in icing--observations were made of black spot incidence during storage of lots of shrimp that had been exposed on deck before being iced. A portion of the lot was iced promptly, then other portions were iced after periods of exposure varying from 1 to 6 hours.

6. Method of icing--the usual method of mixing shrimp and ice was compared with icing the shrimp in layers.

7. Type of ice--finely crushed "snow" ice was used on board the boats. However, in one test, the shrimp were stored in the laboratory in coarse, medium and finely crushed ice to determine if particle size affected the rate of black spot formation. In another test, a special aerated ice was compared with the regular nonaerated ice.

8. Position of shrimp in the pen--portions of the catch that had been iced near the front, in the middle, and at the rear of the pen were separated as they were removed from the hold to observe differences caused by position of shrimp in the pen on the incidence of black spot during subsequent storage.

9. Frozen storage--a portion of each lot of shrimp was packaged and placed in storage at +5° F. immediately after it arrived at the laboratory. Some lots were observed after 4, 8, and 12 months to determine if storage resulted in increased incidence of black spot.

Results.--Delay in icing the shrimp below deck markedly increased incidence of black spot. Natural variation in the pattern of black-spot development and difficulty in separating the individual effects of the numerous handling factors tended to obscure the influences of the specific factors studied. There were indications that the following factors, alone or in various combinations, tended to increase black spot during storage: (1) long drags, (2) bruising of shrimp on deck, (3) storage of shrimp without washing, (4) storage of shrimp with heads on, and (5) poor icing practices. The type of ice used, the method of icing, position of shrimp in the pen, or frozen storage of shrimp up to a year were not associated with differences in the incidence of black spot.

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changes occur most readily in the more unsaturated fats.

Precautions should be taken in homes and restaurants not to overheat fats and not to use them too long in deep-fat frying so that toxic products might be produced. Industry would be wise to avoid processing conditions involving thermal oxidation and thermal polymerization and to avoid marketing of products containing fats so damaged.

Although ordinary processing, oxidation, or polymerization does not often cause serious chemical alteration of food fats, commercial hydrogenation of fats results in profound changes in chemical composition. These changes alter the unsaturated acids of the original fat and cause enormous destruction of an essential nutrient.

The extensive use of hydrogenated food fats in America has not been proved to constitute any serious health hazard. The principal proved consequence is the great reduction in content of essential fatty acids.

If, however, the essential fatty acids, or the total unsaturated acids, have some effect on lowering the level of blood cholesterol, as recent laboratory work has indicated may be possible, and if a lower cholesterol level is advantageous in the prevention of atherosclerosis, which is alleged but not proved, any treatment of fat that seriously alters its content of these acids or that converts them to compounds injurious to health should be critically studied and evaluated. Continued study of the effects of hydrogenated fats in human nutrition over a long period of time would be desirable, along with the future objective of developing processing methods that will retain the essential fatty acids, or the total unsaturated acids, in dietary fats.

2.1476

the decline of the winter and summer fishing. One possibility is that disease had seriously reduced the abundance of herring in the area, and that this may also have affected the spawning periods and locations. The experiments clearly demonstrated, however, that drift-net fishing was superior to anchored nets. The author states that it would seem reasonable to recommend an extension of the drift-net method to other areas along the south coast of Newfoundland during late spring and early summer with the expectation that present landings could be increased substantially.

2.9 EPIDEMIC SHELLFISH POISONING IN NEW BRUNSWICK, 1957

Bond, R. M. and Medcof, J. C. (St. Andrews, New Foundland)
The Canadian Medical Association Journal 79, 19-24 (July 1, 1958)
Studies 1958, from the Stations of the Fisheries Research Board of Canada, FRB 518 (1959) (Ottawa)

Introduction. --Two epidemics of paralytic shellfish poisoning occurred in Canada in 1957--one in New Brunswick in June, the other in British Columbia in October. Bivalve molluscs such as clams and mussels along various sections of both coasts occasionally become poisonous. Sometimes they are poisonous enough to produce illness and even cause the death of the consumer. Investigation has shown many differences in conditions and times of occurrence of the outbreaks. Evidence is not available to indicate that the two outbreaks in 1957 are related.

Extent of epidemic. -- In New Brunswick, 33 people are known to have been poisoned from shellfish in 1957. The offending shellfish all came from a 20-mile section of the coast--Dipper Harbour, St. John County to Deadmen Harbour, Charlotte County. One case involved the bar clam, (Spisula solidissima), all of the other cases involved the soft-shell clam (Mya arenaria). Most of the people were picnickers who ate clams that they dug while at the seashore. Four were hospitalized; a dozen received medical attention in their homes; the others recovered without medical assistance; and none died.

Estimating poison dosages. -- Poison dosages in mouse units for those who ate raw clams were calculated by multiplying the total weight in grams of clam meats consumed by the poison content per gram of raw meats. The latter value was determined by the Laboratory of Hygiene from assays of extracts of 100-gram samples of raw clam meats.

Medcof et al. (1947) showed that, on an average, 100 grams of cooked meats contain only 30 percent

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 ABSTRACTER: Martin Heerdt

3.2490 PROBLEM: PREVENTING WEIGHT, FLAVOR LOSS, DISCOLORING IN FROZEN LOUISIANA OYSTERS

Fieger, E. A.; Novak, A. F.; and Bailey, M. E. (Louisiana State University, Baton Rouge)
Quick Frozen Foods 22, 72-73 (November 1959)

In Louisiana, oysters of prime quality are harvested during the winter and spring months, and oysters of poorer quality are harvested during the remainder of the year. It would be desirable, therefore, to freeze oysters during the winter and spring for sale during late summer and fall.

The difficulty with this suggestion is that several oyster processors and restaurant operators claim that a satisfactory frozen product cannot be obtained using oysters grown in the Gulf of Mexico. The study reported here was undertaken to investigate various treatments and freezing techniques for developing a procedure that would result in a satisfactory product.

Upon comparing the qualities of oysters frozen according to good commercial practice with those of the fresh product, it soon was observed that several undesirable changes occur during frozen storage: (1) The edges of the oyster mantle turned dark and finally became black. (2) Many of the oysters developed a pink discoloration at the edge of the adductor muscle that later spread over the body of the oyster. (2) With increasing length of frozen storage, the thawed product became fragile, and great care was needed to prevent tearing. (4) During storage, the surface tissue of the body became more transparent revealing a dark spot that progressively turned dark green to black in color.

The dark spot is particularly objectionable because it persists even during cooking, even when coated with batter and fried. The frozen oysters showed a rapid increase in loss of weight upon cooking after only 1 or 2 months of frozen storage. These changes result in reduced consumer acceptance. Several southern oyster packers discontinued their freezing operations after one season's

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 ABSTRACTER: Kathryn L. Osterhaug

3.10 THE FOOD ADDITIVES AMENDMENT

Checchi, Arthur A. (Food and Drug Administration, U. S. Dept. of Health, Education and Welfare)
Food Technology 12, 604-606 (November 1959)

Introduction. --The scope of the Food Additives Amendment to the Federal Food, Drug, and Cosmetic Act can best be visualized by examining the definition of a food additive. Briefly, a food additive is any substance that either directly or indirectly may, under the intended conditions of use, become a component of food. To really understand the law, the food packer should look first at the exemptions and then bear in mind that everything else that may reasonably be expected to get into food is subject to this law.

The exemptions are (1) any substance that is generally recognized by appropriately qualified experts as being safe for its intended use in food and (2) any substance that was approved or sanctioned prior to the enactment of the Amendment, pursuant to the applicable provisions of the Federal Food, Drug, and Cosmetic Act, the Meat Inspection Act, or the Poultry Products Inspection Act. Exempt substances are limited to the specific conditions set forth in the sanction, and they are not exempt for other uses. A third exemption applies to pesticide chemicals used or intended for use in or on raw agricultural commodities. These are subject to the Pesticide Chemicals Amendment to the Federal Food, Drug, and Cosmetic Act. The Food Additives Amendment does not appear to apply to coal tar colors because specific sections of the existing Act apply to them. Any other substances that may be expected under intended conditions of use to get into food are subject to the Food Additives Amendment.

Specific additives. --The Amendment is concerned with both direct and indirect additives. An example of a direct additive would be an emulsifier added to a food to improve its texture, whereas

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 ABSTRACTER: Martin Heerdt

3.27 THAWING OF FROZEN FISH

Anonymous
Food Manufacture 34, 364 (September 1, 1959)

Introduction. -- The industrial thawing of frozen fish, which normally takes up to 24 hours in air can now be done in about 15 minutes by dielectric heating. This new development, which solves a major problem of the fish industry, is the result of work at the Torry Research Station of the D.S.I.R. A patent application has been made for the method, which is of great economic significance in the quick frozen food industry and may have wider application.

Dielectric method. -- The method, known as dielectric thawing, depends on the fact that if any material is placed between, but without touching, two metal plates charged with an alternating voltage of many thousands of volts at a frequency of about 40 million cycles per second, energy is produced in the material in the form of heat. Under well defined conditions, fish may be uniformly thawed throughout a block of the frozen material--either as whole fish, as in the case of herrings, or as fillets. It is possible to control conditions far more accurately than in existing methods, for example, so that individual fish in a block may be separated while remaining partially frozen.

Experimental findings. -- Laboratory-scale experiments at the Torry Research Station, Aberdeen, had shown that it was possible to use dielectric heating successfully on tiny pieces of frozen fish. Pilot scale apparatus, using slightly modified equipment which is commercially available, was therefore set up. The problem of "runaway heating" in which small portions of blocks of fish absorbed the major part of the available energy and became cooked while the rest of the block remained hard frozen had to be overcome, but now the fish may be fed into the machine on an endless belt and thawed in 15 minutes.

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SHELLFISH POISONING IN NEW BRUNSWICK

FOOD ADDITIVE LAWS

FREEZING LOUISIANA OYSTERS

THAWING OF FROZEN FISH

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an indirect additive would be a substance that gets into food as a migrant from packaging material. In addition, the Amendment specifically covers any sources of radiation used on food and states that any food intentionally subjected to radiation will automatically be deemed adulterated unless the radiation is administered in accordance with a regulation or exemption in effect pursuant to the Amendment.

The Amendment also is concerned with substances such as residues in meat, milk, eggs, and drugs or their conversion products that have been administered to animals that contribute to the human food supply. If such residues remain, they must be shown to be safe for human consumption.

Any substance subject to the Amendment may not be used in or on food except pursuant to a specific authorization secured in advance of use. Persons wishing to use an additive may submit a petition requesting such authorization. The petition must (1) provide the name of the proposed additive including its chemical identity and specifications, (2) tell how the additive is to be used, and (3) explain the technical effect that the additive is intended to achieve. The petition also must (1) furnish methods of analysis for determining the presence of the additive or its conversion products in or on food and (2) set forth complete toxicity data showing that the additive is safe for its intended use.

The Food and Drug Administration, on receipt of a petition and on the basis of presented and otherwise available data, will decide if, and under what conditions, the proposed additive may be permitted. If the Food and Drug Administration decides affirmatively, a regulation setting forth precisely the conditions under which it may be used is published in the Federal Register. Notices of nonaffirmative decisions also are published in the Federal Register.

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Methods compared.--At present fish is thawed by laying it out in the air; it is sometimes, in addition, sprayed with water. Under these conditions, fish on the outside of a block thaws quickly and begins to deteriorate, while that in the middle remains frozen. The new method requires no handling during thawing, is quick and, therefore, keeps deterioration to a minimum, and the equipment does not take up much floor space.

Cost.--The capital cost, about £ 10,000 for equipment to thaw 1 ton of fish per hour, is said to be comparable to that for freezing equipment of similar capacity. Running and depreciation costs appear to compare favourably with the costs of existing methods of thawing.

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as much poison as 100 grams of raw meats. Dosages for those who ate cooked clams were calculated by multiplying the weight in grams of cooked meats consumed by 30 percent of the toxicity per gram of raw meats from the same source.

Dosages and symptoms.--In 1957, as in 1945, several people ingested relatively large amounts of shellfish poison or as much as 13,000 mouse units and exhibited no symptoms of illness. Mild and severe cases developed from both large and small amounts of the poison. Records from the 1945 epidemic show much the same picture.

The most severe poisoning was experienced by a woman who had ingested 5,500 mouse units of the poison. When first stricken, this woman experienced extreme difficulty in respiration, and her teeth became loose. She recovered slowly, but otherwise normally, until the 4th day, when she suffered a complete recurrence of all her symptoms of poisoning, almost as acute as on the night of her first collapse. A relapse of this sort has never been reported. Looseness of the teeth persisted and before her recovery, after 18 days, three teeth actually came out. Halstead believes this to be the first record of loss of teeth from fish or shellfish poisoning.

Management problems.--The Canadian Department of National Health and Welfare and the United States Department of Health, Welfare and Education have agreed that shellfish with scores up to 400 mouse units per 100 grams are safe. Accordingly, and on the basis of regular tests, areas are closed for commercial harvesting and marketing of raw shellfish as soon as this level is approached. Similarly, quarantined areas are reopened as soon as controlling agencies have satisfied themselves that scores have fallen below the 400-unit level and that they are likely to remain there.

3.2490

trial. In an effort to eliminate or reduce these undesirable changes, various treatments and packaging techniques were tried.

Experimental.--The effects of the following variations in handling procedure were compared: (1) washing oysters with fresh water, various salt solutions, and a chlortetracycline solution before freezing; (2) nonglazing and glazing with fresh water, a salt solution, and a chlortetracycline solution; and (3) using various types of packaging materials.

The packaging materials that were used included waxed cartons with overwrap, heat-sealed cellophane and mylar bags, and waxed cups with friction covers. Samples of oysters also were packed in C-enamel cans under 18 inches of vacuum. Samples stored at 0° F. were removed at monthly or bimonthly intervals and examined. Objective methods were used in the examination.

Results.--Washing with a solution of common salt prior to freezing reduced the amount of drip formed upon thawing and reduced the amount of weight lost during cooking. These oysters also had a better flavor than those washed with plain water.

Oysters washed prior to freezing in the chlortetracycline solution had a better general appearance in the frozen state and also after thawing than did the water-washed samples. This treatment, however, did not influence loss in weight upon cooking of the oysters.

Glazing oysters with water or with a salt solution extended the storage life before rancidity developed by about 3 or 4 months when they were compared with oysters in overwrapped cartons.

Vacuum packing resulted in a slightly better product than any of the other methods studied.

None of the results obtained indicated that the commercial freezing of Gulf of Mexico oysters can be recommended. This report is designed to inform potential freezers of oysters what problems they may encounter.

3.2495 FAT HYDROLYSIS IN FROZEN FISH. 2. RELATION TO PROTEIN STABILITY

Fraser, Doris I. and Dyer, W. J. (Fisheries Research Board of Canada, Technological Station, Halifax, Nova Scotia)
Progress Reports of the Atlantic Coast Stations, Fisheries Research Board of Canada No. 72, 37-39 (September 1959)

Introduction.--The grading of cooked samples of frozen fish by a trained taste panel provides a fairly good measure of the changes in texture and taste that occur during storage. In lean fish such as cod one of the main changes that occurs is the development of toughness. The cod becomes progressively more chewy; and, eventually after long storage, may become almost like sawdust. This change, which is called denaturation, is attributable to an alteration in the proteins of the muscle tissue. When muscle proteins become denatured they become increasingly less soluble in salt solution. In addition, these proteins lose some of their ability to retain the moisture with which they normally are associated.

Protein changes at +10° F.--During the first month of storage at +10° F., the extractable protein of cod changed very little. During the next 4 weeks the extractable protein decreased suddenly. This was followed by a gradual levelling off in the extractable protein of cod. A comparison of the cod stored at +10° F. with the original cod indicates a rapid production of free fatty acids during the first month. The increase in free fatty acid was followed by a rapid denaturation of the protein. In this experiment, lipid hydrolysis preceded the protein change. From these results, the authors were unable to decide whether the intact lipids stabilize the protein, or whether the free fatty acids initiate the denaturation process. About half of the lipid in the muscle tissue was hydrolyzed by the end of the second month. The removal of this amount of lipid from the protein particles may render them

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 ABSTRACTER: Martin Heerdt

3.338 STRIKING STEP-UP IN CAN HANDLING

Havighorst, C. R.
Food Engineering 31, 60-61 (November 1959)

Introduction.--An important step generally omitted in mechanized can handling is the can infeed, which has tended to remain a manual operation. Now, bulk palletization is providing an efficient method for handling vertically stacked layers of empty containers.

An Oakland, California packer of baby foods, one of the first to install bulk palletization, utilizes five depalletizers to handle more than 2½ million cans daily with the following advantages: (1) an in-feed rate of up to 2,000 cans per minute per depalletizer, (2) one-third of the labor formerly required for manual in-feed, (3) a constant, even flow of cans to fillers, (4) large volume handling and storage of cans in comparatively few packages, (5) easy fork-truck handling, and (6) better protection from damage and dirt.

Routine.--At the can plant, pallet loads of cans tiered two high are loaded by fork-truck onto four sets of roller conveyors fixed on the floor of a truck-trailer. At the packing plant, the pallet loads are rolled onto two powered belts that move the pallets onto two gravity roller conveyors. These two conveyors will accommodate one truck load. In-feed belts, which are on a hinged frame, may be raised to clear the loading dock for other traffic.

Fork-trucks lift pallet loads from the receiving conveyors and store them four pallets high. To assure an adequate supply of cans, the baby food packer has allotted a warehouse adjacent to the depalletizers for 50 million cans. The same fork-truck is used to feed pallet loads to anyone of five depalletizers that are equipped with dual can-waterfalls, each of which serves an individual can elevator. A diversion plate may be placed across the mouth of one of the waterfalls to reduce the flow

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 ABSTRACTER: Martin Heerdt

3.25 STILL FROZEN--SIX DAYS FROM A FREEZER

Anonymous
Western Canner and Packer 128, 27 (November 1959)

A trailer that had been packed with 0° F. frozen foods in Sunnyvale, California, arrived in Chicago 6 days later with an average internal temperature of -17° F. The insulated trailer in which the frozen food had travelled was not equipped with refrigeration machinery and had required no attention en route.

After the insulated trailer had been packed with the frozen food, technicians placed thermocouples in each corner and between each of the eight insulated sections. The insulated box within the trailer body then was closed and the rear doors of the trailer were swung shut. Liquid nitrogen was injected through a vent in the top of the trailer until the temperature within the container was reduced to -40° F.

The potential advantages of this new method of refrigerating frozen foods during transport include the following:

1. The immediate advantage is that it allows long shipments of frozen foods by piggy-back without using either mechanical refrigeration equipment or providing an operator to accompany the shipment.

2. Subsequent developments may find shortcuts in the entire distribution system. The cost of initial sharp-freezing fruits and vegetables may become part of the cost of refrigerated shipment to the warehouse. One application of liquid nitrogen could drop temperatures more rapidly than

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 ABSTRACTER: Kathryn L. Osterhaug

3.63 COMMERCIAL APPLICATIONS OF THE FREEZE-DRYING PROCESS FOR DEHYDRATION OF FOOD PRODUCTS

Anonymous
Le revue de la conserve No. 7, p. 67 (Sept. 1957) (In French)
World Fisheries Abstracts 10, 33-34 (July-August 1959)

Freeze-drying is largely used to dehydrate labile biological substances, such as blood and plasma. The principle involved is very simple: the frozen product is submitted to a very high vacuum, in that condition there is a sublimation of the ice crystals. The advantage of the process for food is that the nutritive and organoleptic components of the heat labile foods are preserved. The products obtained have a spongy and porous texture, which make subsequent rehydration instantaneous and complete to a degree never reached in the case of thermetically dehydrated products.

Attempts have been made for many years to apply this method of preservation to liquid and solid foods. Although very interesting results have been obtained, many difficult technical and economical problems have arisen. The sublimation of the ice crystals requires a supply of heat that must be very carefully regulated. Heat penetration in the mass is not uniform. This is particularly the case with compact items. Active research continues, however, for making the process suitable for commercial application. It seems that in the U. S. A., there is a rather advanced stage of the development. Freeze-drying was discussed at the last meeting (12-16 May 1957) of the Institute of Food Technologists in Pittsburg, Pennsylvania. Dr. D. A. Copson presented the experimental results of a new auxiliary technique for freeze-drying. In the freeze-drier, the product is exposed to electromagnetic microwaves of 2,450 megacycles. This ensures a very accurate and uniform supply of heat to the whole product and accelerates the rate of drying. A 25-mm. (1 in.) thick steak was dried in 5 to 6 hrs., utilizing 1,750 w. per hr. In commercial operations, the duration of the

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 ABSTRACTER: Jacques Chaux

FAT HYDROLYSIS VS. TOUGHNESS

REFRIGERATED TRANSPORT

AUTOMATIC CAN HANDLING

FREEZE-DRYING FOR DEHYDRATION

3.25

conventional sharp-freezing equipment within the body of the over-the-road truck. No cost figures were mentioned; however, the cost of refrigerating the trailer shipment was high, since more nitrogen was used than was needed.

3. The new frozen food code, which has been adopted by the Association of Food and Drug Officials of the United States, calls for shipments to be held at 0° F. or lower. Although a "gentlemen's agreement" may keep strick enforcement away for a few more years; a fool-proof system eventually will be needed to insure an acceptable temperature at arrival. A fool-proof system could well consist of a sealed container frozen by the Liquefreeze method with an extra bottle of liquid nitrogen provided for emergencies. Longer trips would require more nitrogen and lower temperatures but no more equipment or different packages.

4. Finally, the entire trip from packer to retail store display freezer could be made in the same sealed container, if only a few days elapsed between freezing and store delivery.

3.63

treatment could be reduced by 75 percent. Experiments were completed with such products as shrimp and rock lobster tails, and excellent products resulted as judged from appearance, flavor, keeping quality, and almost instantaneous rehydration.

In Canada, the army laboratories for medical research use heating plates that are fitted with tin metal points 0.5 to 0.6 mm. spaced, which penetrate the product. This makes heat penetration easier and accelerates the dehydration under vacuum. A 25-mm. thick slice of meat was dehydrated in 3 to 5 hours instead of 16 to 18 hours by the normal method. Dielectrical and infrared heating were used by some workers and their methods seem to offer possibilities in the case of certain products.

The British seem to be the most advanced in the application of freeze-drying for foods. A pilot commercial freeze-drier with heating plates is already working in the government experimental plant at Aberdeen, Scotland. The equipment works under a 1 mm. (0.039 in.) mercury vacuum and treats batches of material weighing 1 ton. Preliminary trials of 1,000 kg. (2,204 lb.) of fish fillets were dried in 8 hours at a 10 mm. (0.393 in.) vacuum.

According to specialists, within the next 3 to 5 years, the process will be in full commercial use. According to Americans, this time could be reduced to 2 to 3 years through the intensification of research.

3.2495 (Cross Reference: 4.23)

susceptible to denaturation, or an increase in the free fatty acid content might be sufficient to change drastically the properties of the proteins and so initiate the process of denaturation.

Protein changes at -10° F.--In frozen cod fillets stored at -10° F., the extractable proteins normally reach their lowest values in 10 or 11 months. At this point, the fillets have deteriorated both in texture and in taste to the point where they are rejected by a taste panel.

In this experiment, the results of storage at -10° F. were unexpected. After 16 to 18 months of of storage at -10° F., the cod fillets showed only a very slight decline in extractable protein. Taste-panel tests that were used to evaluate these samples after 1 year of storage at -10° F. provided scores that were almost as good as the scores for fresh cod, both for texture and for taste. This confirmed the protein solubility data. At present, no explanation can be given for this unusual keeping quality. In the past, a few samples from both laboratory packs and commercial packs have retained their good quality longer than usual. The results of storage using cod that had been held in ice for 1 day before being filleted and frozen were identical with the results of storage with cod held in ice for 8 days. Freshness, therefore, does not explain the unusual keeping quality; however, the number of packs processed were too few to rule out the possibility of a seasonal difference.

Fatty acids apparently do not significantly affect taste since the taste-panel scores were still high after 1 year of storage at -10° F. These results are consistent with results obtained from storage at +10° F. This experiment was terminated just before the free fatty acid values reached the critical level. By this time the enzymes also may have been partly inactivated.

Conclusions.--This study shows that protein denaturation and the development of toughness in stored frozen cod are related to hydrolysis of the lipid fraction. It also shows that under certain conditions frozen cod may retain its fresh fish quality for at least a year and a half. The factors responsible for the improved keeping quality are as yet unknown.

3.338

to about one-half of the delivery volume of the unit.

During a season, the packer used 16 different types of cans consisting of three different sizes and treatments. Some of the cans are enameled, some are plain, and others are lithographed with the company label. Using bulk palletization and plug-in controls, it is possible for the operator to simultaneously handle five different types of containers and route them to product fillers over eight can lines.

Filler operators control the flow of cans to their units by the use of push buttons. When the flow is stopped in a line, input from the depalletizer unit continues until the line fills up to its elevator can-drop. At this point the cans close a switch that automatically stops the depalletizer's take-away wire belt until the operator again actuates the line. Operation of the can supply system requires eight men, including a fork-truck operator, a relief man, and an empty-can foreman.

Depalletizer details.--Manual, semiautomatic, and automatic depalletizers have been developed. The manual unit has a capacity of from 150 to 800 cans per minute according to can size, and is useful for medium-speed operations. The automatic unit, which is largely used by brewers and has a maximum capacity of 1,600 cans per minute, requires no operator other than the fork-truck driver. Except for the can-converger motor, all power used by the automatic unit is hydraulic power that is developed by a 3-horsepower motor. The intake conveyor has space for two full pallets in addition to the one being unloaded. The same chain conveyor that feeds loaded pallets to a push button-operated elevator moves empty pallets to the discharge roller conveyer for pick-up by the fork-truck. To unload cans, the operator elevates the load until the top layer of cans strikes a control plate that stops the cans at a point that is level with the take-away wire belt. With another button, the operator, then actuates a bar that sweeps the entire layer of cans from the chipboard separator onto the take-away belt. This cycle is repeated until the pallet is empty; whereupon the operator lowers the empty pallet, discharges it, and positions another loaded pallet on the elevator.

3.5 CONSTITUENTS OF SALT COD PICKLE

Van Klaveren, F. W. and Vaillancourt, G. (Fisheries Research Board of Canada, Technological Station, Grande-Riviere, Gaspe, Quebec)
Progress Reports of the Atlantic Coast Stations, Fisheries Research Board of Canada No. 72, 19-22 (September 1959)

Introduction. --At present, some 50,000 tons of waste brine or pickle is discarded annually as a byproduct of Canadian salt cod production in the Atlantic Provinces for lack of information on its composition and value as a byproduct. This study was made, therefore, to examine the constituents of waste pickle from salt cod for their possible recovery and utilization.

Preliminary study. -- Pickle from the preparation of Gaspe cure salt cod contains about 13 percent salt, whereas pickle from the preparation of heavy cure salt cod is saturated and contains about 25 percent salt. Soluble, heat-coagulable proteins and some free amino acids, resulting from the breakdown of proteins, were known to be present in cod pickles from previous work at this Station. Certain pigments also are present that give the pickle a yellow color in ordinary light and produce a greenish or blue fluorescence when the pickle is viewed in ultraviolet light.

Protein separable from the pickle. -- The proteinaceous constituents of cod pickle that are initially soluble will coagulate and precipitate as the pickle is heated to the boiling point. This precipitate will yield 0.6 percent of recovered proteinaceous material containing 15.1 percent protein nitrogen and 1.1 percent ash if it is filtered from the residual liquid, washed, dialyzed against water to remove any remaining salt, and then dried. The amino acid composition of this material is quite similar to that of the muscle protein of dried whole cod. Repeated and prolonged dialysis against water, however, did not remove the fluorescent blue color of the precipitated protein that could be seen under ultraviolet light.

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 ABSTRACTER: Martin Heerdt

4.83 FISH OILS IN THE PAINTING INDUSTRY. PART 1

Huesa Lope, J.
Grasas y aceites 8, No. 5, p. 226 (1957) (In Spanish)
World Fisheries Abstracts 10, 45-46 (May-June 1959)

The desirable quality of the oils utilized for paint is indicated by a high iodine number. There are oils that contain high unsaturation; generally, however, it is necessary to treat these oils to render them suitable for paints. It is essential that they are perfectly refined, neutralized, decolorized and deodorized.

Regarding the physical process for improving the fish oil, the "winterization" must be taken into account because it can increase the iodine number in some oils as much as 40 units. This is now achieved with solvents (Emersol's process).

Today, the process of interesterification is used to improve the drying quality of oils. For the oils to be applied in the enamels and paints industry, it is convenient to subject them to a previous oxidation process (bodying) that produces polymerization. This is brought about by passing air at 95° to 120° C. (203° to 248° F.) through the oils. During 6 hrs. the iodine number in sardine oil falls rapidly from the range 180 to 190 to 120 to 130. The oxidation of oils can be speeded up with catalysts, but this method has the disadvantage of imparting strong color to the oil. Oxidation by other methods than the use of air is not of any commercial interest, though they are used for analytical purposes. Various oils have been tested, particularly those of hake that have an iodine number of 111. By using a current of moist air, mechanical stirring at 120° C. (248° F.) and 0.5 percent of MnO_2, a product with a hydroxyl number 87 and of great viscosity is obtained after 8 hrs. treatment. With the use of sardine and cotton seed oils, the same results have been obtained.

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 ABSTRACTER: F. Lopez-Capont

3.61 DESIGN OF FREEZE-DRYING EQUIPMENT FOR THE DEHYDRATION OF FOODSTUFFS

Smithies, W. R. and Blakley, T. S. (Defense Research Medical Laboratory, Toronto, Ontario, Canada)
Food Technology 13, 610-613 (November 1959)

Introduction. -- Batch-type freeze-drying equipment consists, basically, of one or more vacuum chambers, a pumping system, and a source of heat to sublime the ice from the product being dried. In conventional pharmaceutical drying equipment, the material is laid on shelves that are heated during the drying cycle. The speed of drying is very slow; and primarily for this reason, the process is uneconomical when applied to relatively low-cost foodstuffs.

Purpose. --Abelow and Flosdorf and Powers et al., who made use of radiant heat from blackened heating shelves to supply heat of sublimation to freeze-drying material, did not attempt fully to determine the optimum conditions of drying. These conditions have been investigated, and this paper describes how radiant heating can be used to operate a moderately fast freeze-drying process.

Development of equipment. --A Stokes' Industrial Model No. 2005 FX-4 freeze-drier was modified by removing the hollow drying shelves from the vacuum chamber and replacing them with electrically heated plates. Radiating surfaces were painted a dull black; nonradiating surfaces were insulated with asbestos sheet or board.

Freeze-drying using radiant-heating plates. --A typical drying cycle using one pair of small radiant-heating plates is as follows: Pieces of raw or cooked meat in the form of steaks, chops, slices, or patties up to ½ inch in thickness are arranged on an aluminum tray with the lower side

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 ABSTRACTER: Martin Heerdt

4.91 STUDIES ON THE CONJUGATED FATTY ACIDS PART III. FAT ABSORPTION AND DISTRIBUTION STUDY IN FISH. 1. APPLICATION OF THE CONJUGATED FATTY ACIDS FOR THE RESEARCH ON THE FAT METABOLISM OF THE CARP, CYPRINUS CARPIO LINNE

Tsuchiya, Yasuhiko and Kayama, Mitsu (Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 9, 41-52 (March 1958)

Introduction. --The fatty acid composition and the unsaponifiable content of marine oils have been investigated systematically by Tsujimoto, Hilditch, and Lovern et al. They have reported on the oil composition of herring, cod, sardine, saury, shark, and trout, all of which were caught in season. In contrast, studies on the fat metabolism of fish in the aquarium are few because of experimental difficulties.

Purpose. --In this study, the authors used the intra-intestinal intubation technique for the first time with a catheter made of polyethylene to introduce the test fats into carp. They also traced the fat absorption and distribution in carp held in an aquarium over a period of time and measured the ultraviolet absorption of the conjugated fatty acids with a Beckmann spectrophotometer. These studies were made to determine if conjugated fatty acids are toxic to carp, and if they are metabolized in the same way as the natural fatty acids in the rats. Conjugated cod-liver oil isomerized with nickel-on-carbon catalyst and Chinese tung oil were used as the test materials.

Studies with rats showed that (1) even though there is some antimetabolic action of the conjugated fatty acids in long-term feeding, the acids can be used in a fat metabolism study as a tracer and (2) the conjugated fatty acids follow a distribution pattern similar to that of the natural fatty acids.

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 ABSTRACTER: Martin Heerdt

ASSAY OF SALT COD BRINE

FREEZE DRYING EQUIPMENT

FISH OIL IN PAINT

METABOLISM OF CONJUGATED FATTY ACIDS

3.61

blackened. When required, another sheet of aluminum with the upper side blackened is laid on top. After the meat has been frozen, the tray is placed between the radiant-heating plates in the vacuum chamber with a gap of from $\frac{1}{4}$ to $\frac{1}{2}$ inch at the top and bottom. The temperature-controlling thermostat connected to the tray is set at 50° C., and the chamber is evacuated to 0.5 to 1.0 mm. of mercury, absolute pressure.

Power is supplied at a level of 240 watts for each heating plate or 180 watts per square foot of radiating surface. The temperature of the tray reaches 50° C. after about 1 hour, and drying is complete after $6\frac{1}{2}$ to $7\frac{1}{2}$ hours. A typical freeze-dried product is obtained without any thawing or pigment fading due to heat damage and with an average moisture content of 1 to 2 percent.

The effect of the tray.--Drying is accelerated by supporting the meat on a tray of expanded aluminum and leaving the top uncovered, for in this way the radiant heat is absorbed more or less directly by the meat itself. A cover on the meat layer, however, will prevent (1) warping during drying and (2) subsequent difficulties in packaging the product. Meat pieces may be subjected to a pressure of up to 0.2 pounds per square inch from the weight of the covering plate without hindering the escape of water vapor.

Heating-plate gap.--The size of the gap between the meat and the radiant-heating plates may be varied over a range of at least $\frac{1}{4}$ to 1 inch without markedly affecting the rate of dehydration. Satisfactory drying rates were also achieved when the gap at the top was increased to $\frac{3}{4}$ inch while maintaining the bottom gap at $\frac{1}{4}$ inch.

Control of thawing during loading and evacuation.--In large-scale drying, up to 30 minutes may be needed to load the chamber and reduce the absolute pressure below 2 to 3 mm. of mercury. A tendency for the frozen material to thaw during this time presents a serious problem. Thawing is difficult to avoid even if meat slices are dried in laboratory equipment, and a slight hardening of the bottom surface results. If thawing becomes more general, as during the subsequent evaporative freezing, meat juices are lost and the texture and flavor deteriorate.

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Free amino acids in the pickle.--The liquid that remained after filtering off the proteins precipitated by boiling the pickle, contained too much salt to allow for separation and identification of other dissolved substances. This liquid was then diluted to the extent of two or three times its original volume with a mixture of three common organic liquids that are miscible with water but that do not dissolve salt. Most of the salt was forced out of solution and filtered off. The filtrate then was concentrated by boiling under a vacuum and diluted to the extent of three times its volume with another mixture of common organic liquids. The crystalline, white, nonfluorescent substance that separated was identified chromatographically as taurine, a sulphur-containing amino acid. The taurine remaining in the solution was removed by column chromatography so that the other amino acids in the liquid could be separated and identified by paper chromatography.

Fluorescent substances in the pickle.--The greenish fluorescence of the golden yellow deproteinized pickle changed to a blue fluorescence during the desalting procedure described above. Neither of the pigments responsible for the fluorescence could be isolated. The golden yellow color remained distributed among all the fractions separated, and the blue fluorescence persisted in association with the taurine and certain other nonfluorescent amino acids.

Commercial aspects.--The 0.5 percent of heat coagulable protein that can be recovered from cod pickle is too small for commercial production. It is possible, however, that the precipitated protein could be worked up together with fish offal in the manufacture of fish meal. If colored impurities are removed from the pickle by means of adsorbents such as charcoal, the purified pickle may be used in a brine-salting procedure that is now being investigated at this Station. The taurine, glutamic acid, and other amino acids present in the pickle do not appear to be of commercial value at the present time.

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Results.--Chinese tung oil (0.3 ml.) that was composed chiefly of a triglyceride of eleostearic acid with three conjugated double bonds was placed into the preintestine of the carp with a polyethylene tube connected to a syringe. The rate of absorption and the distribution of the tung oil were followed by spectrophotometric analysis over a period of time. Changes in the absorption maxima were observed in the tissues with a loss of the absorption band at 270 mμ and with a rapid rise in absorption at 235 mμ, especially in the spleen, kidney, and hepatopancreas. Disappearance of the absorption band in the pre-, meso-, and post-intestines of the carp after 2 to 3 days was proved experimentally.

4.83

The polymerization of fish oils is achieved by heating at a very high temperature in the presence of a special catalyst (soaps of heavy metals, SO_2, Se, etc.) to speed up the process. Fish oils can be polymerized in the presence of air, which is quicker, or in an inert atmosphere. In the latter case the color of the resulting product is very pale. With sardine oil, the author found that it is polymerized at 175° C. (347° F.) in an inert atmosphere without noticeable changes. At 175° to 200° C. (347° to 393° F.), the iodine number began to fall quickly upon heating for 6 hrs. at 250° C. (482° F.). For total polymerization, heat must be applied for 2 hrs. at 300° C. (572° F.), which results in the elimination of substances formed during the process, such as acids, aldehydes and ketones. From this research, it has been found that the critical temperature for the polymerization of fish oils similar in composition to that of the sardine, is 250° to 275° C. (482° to 527° F.).

4.89 SELECTIVITY FACTORS IN FLOTATION

Fleming, M. G. (The Imperial College of Science and Technology, London, S. W. 7)
Chemistry and Industry No. 40, 1230-1238 (October 3, 1959)

Introduction. --Flotation is the most important, the most complex, and the most interesting method employed in the field of mineral processing. Something over 95 percent of the world's base metals are concentrated by this means and it is an important factor in the production of raw materials for nearly all alloys, many acids, fertilizers, refractories, paints, and solid fuels.

Flotation process. -- Basically, the process consists of the selective partition of solid particles between a liquid and a gas. The particles are suspended in the liquid, gas bubbles are introduced and the desired solid is removed in the froth formed at the surface of the liquid suspension by the rising bubbles. All three forms of matter are involved and nearly all the chemical and physical properties attributable to gases, liquids and solids may influence the result.

The solid, which may be represented as the base of a triangle, is one of perhaps 12 mineral species present in the ore. Its essential properties are its chemical composition and its crystal structure, neither of which, unfortunately, is constant for the species. Also, since particles in suspensions are involved, size, shape and mass will be important. For obvious reasons the gas is nearly always air, although other gases--more or less reactive with either liquid or solid--might be preferable in certain cases. The liquid universally employed is water or an aqueous solution, and as far as the author is aware, no consideration has ever been given to the use of a nonaqueous medium.

Surface phenomenon. -- Flotation is essentially a surface phenomenon so the apices of the triangle representing the interfaces, are of greater importance than the base and sides, which represent solid, liquid, and gas, respectively. These are not sharp boundaries because all three

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6.190 MARYLAND BROILER TRIAL

Combs, G. F.; Halbacka, N. V.; and Nicholson, J. L. (University of Maryland)
Miscellaneous Publication No. 369, Contribution No. 3085 of the Maryland Agricultural Experiment Station (Department of Poultry Husbandry)
Feedstuffs 31, 26-28 (December 12, 1959)

Introduction. -- Broiler trials at the Maryland Experiment Station, University of Maryland, were designed to evaluate a large number of ingredients available for use in the diets of broiler chicks. With this objective before them, the authors have continued to test and evaluate the materials such as animal fats, condensed fish solubles, full-fat soybeans, and various vitamins at different levels of the diet.

This is a report on trial S-27, which is a continuation of broiler-trial studies previously initiated. Trial S-27, which was completed on July 24, 1959, was conducted with an equal number of chicks of each sex reared separately. Vantress cross-bred Arbor Acre chicks used in this study were distributed into 32 pens, each of which contained 150 chicks.

Experimental. -- Variables involved in trial S-27 were (1) pellets containing 2 percent added fat, (2) mash containing 7 percent added fat, (3) 2.5 percent condensed fish solubles as the only source of animal protein, (4) additional vitamins, including pyridoxine, folacin, biotin, ascorbic acid, and vitamin K, (5) unextracted, full-fat soybeans as replacements for all of the soybean oil meal and all or part of the supplemental fat, (6) a change over from starter diets to finish diets that contained higher or lower levels of fat at 5 weeks of age, and (7) yield studies at 8, 10, and 12 weeks of age. All of the feeds were calculated to have relatively wide calorie-to-protein ratios of approximately 48 : 1 in the starter diets and 55 : 1 in the finish diets.

Duplicate pens of males and females were fed each of the diets. Some of the pens received

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ABSTRACTER: Martin Heerdt

5.111 ISOMERIZATION OF VITAMIN A IN VIVO

Murray, T. K.; Stainer, D. W.; and Campbell, J. A. (Department of National Health and Welfare, Ottawa)
Canadian Journal of Biochemistry and Physioloby 37, 1469-1474 (December 1959)

Introduction. --Vitamin A can exist in a number of isomeric forms such as all-trans, neovitamin (13-mono-cis), neo-b (11-mono-cis), 9-mono-cis, 11,13-di-cis, and 9,13-di-cis. The biological activity of these isomers varys widely according to Ames, Swanson, and Harris (1955) and Murray and Campbell (1953). Up to 30 percent of neovitamin A reportedly may occur in many fish-liver oils and synthetic sources, although Lambertsen and Braekkan (1955) doubt its occurrence in vivo. Other cis isomers have been found in various crustacea, but Morton and Bro-Rasmussen (1955) were unable to detect them in fish oils. Since the spectrophotometric method yields a good estimate of the biological potency of fish-liver oils, the occurrence in quantity of cis isomers other than neovitamin A is not likely. These cis isomers, if present, would contribute proportionately much more to the spectrophotometric absorbence of the vitamin preparation at 325 mμ than to the biological activity of the vitamin preparation. Rats stored very little of the 11-cis isomer of vitamin A in their liver when this isomer was included in their diet according to Plank (1959). Brown (1957), unpublished, was unable to find any evidence of the neo-b isomer of vitamin A in cattle liver or serum.

Evidence exists, however, to show that an equilibrium mixture of the isomers of vitamin A is formed in rat livers. Harris, Ames, and Brinkman (1951) found that the livers of rats fed all-trans or neovitamin A each contained approximately 11 to 19 percent neovitamin A. Preliminary experiments, in the authors' laboratory in 1958, showed that considerable interconversion occurred in the intestinal tract after the feeding of a dose of all-trans or neovitamin A and that the all-trans isomer was predominant in the liver. Since neovitamin A is a common constituent of commercial sources of vitamin A activity, a more exhaustive study was planned to elucidate the metabolism of vitamin A by animals.

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ABSTRACTER: Martin Heerdt

6.193 STUDIES ON UNIDENTIFIED CHICK GROWTH FACTORS APPARENTLY ORGANIC IN NATURE

Dam, Richard; Morrison, A. B.; and Norris, L. C. (Department of Poultry Husbandry and Graduate School of Nutrition, Cornell University, Ithaca, New York)
Journal of Nutrition 69, 277-282 (November 1959)

Introduction. --According to Morrison and associates (1955 and 1956), Dannenburg and associates (1955), and Camp, Reid, and Couch (1955), increases in growth, resulting from the feeding of a mixture of crude sources of unidentified growth factors to chicks, appeared to be caused by the presence of both organic and inorganic constituents in the mixture. Evidence for the existence of organic growth-stimulating substances was based upon the markedly greater growth that occurred in chicks when the diet contained intact supplements in comparison with the growth that was obtained with an equivalent amount of organic growth-stimulating substance ashed at 525° to 700° C. The results of further studies on unidentified chick growth factors, apparently organic in nature, are presented here.

Experimental. -- Purebred White Plymouth Rock Chicks or crossbred chicks from White Plymouth Rock hens mated to Vantress males were used in this study. The hens had been fed a simplified diet, that contained no sources of unidentified chick growth factors. All chicks were placed on the test diets at approximately 1 day of age and maintained on them for 4 weeks. Feed and water were supplied ad libitum, and a weekly record of feed consumption was made at the time the chicks were weighed.

Two basal diets designated as diet A and diet B, each containing glucose monohydrate and soybean protein as the major ingredient, were used. The metabolizable energy content of diets A and B were, respectively, 3065 and 3495 Calories per kilogram. The protein content (nitrogen x 6.25)

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ABSTRACTER: Martin Heerdt

MINERAL PROCESSING BY FLOTATION

ISOMERIZATION OF VITAMIN A IN VIVO

MARYLAND BROILER TRIAL

ORGANIC CHICK GROWTH FACTORS

5.111

This paper reports on the proportion of isomers found in the various tissues after dosing with all-trans or neovitamin A and attempts to explain the lower biological potency of neovitamin A as compared with all-trans vitamin A.

Experimental.--Weanling male rats of an inbred Wistar strain were fed a vitamin-A-free diet for 2 weeks, after which time no vitamin A could be detected in their livers. The rats were then divided into two groups. One group received 4,916 units of all-trans vitamin A alcohol in their diet, whereas the other group received 2,500 units of neovitamin A alcohol dissolved in corn oil and administered orally with a tuberculin syringe and blunted needle.

Five rats from each of the two groups were killed by decapitation after intervals of 1, 2, 3, 4, 5, 24, and 48 hours from the time the vitamin A solutions were administered. The intestinal tract, liver, and kidneys were removed and analyzed with their contents. The intestinal contents were expressed manually, and the intestine was washed with 0.9 percent saline. Extracts of kidneys from both groups of animals were fractionated into a 1- to 5-hour fraction, a 24-hour fraction and a 48-hour fraction. The method of Ames, Risely, and Harris (1954) was used to estimate the vitamin A content of the tissues, except that the intestinal contents were saponified prior to extraction with petroleum ether. Neovitamin A was measured by the maleic anhydride method, which distinguishes between fast- and slow-reacting isomers; and the results were expressed in terms of all-trans vitamin and neovitamin A.

Results.--In both cases considerable isomerization occurred in the stomach, and the resulting mixture of isomers appeared to be absorbed by the intestine. The dose of all-trans vitamin A was taken up by the intestine more quickly than was the dose of neovitamin A. An oral or subcutaneous dose of neovitamin A resulted in a relatively high proportion of neovitamin A in the liver, but this proportion decreased during vitamin A depletion to that found after a dose of all-trans vitamin A. The proportion of neovitamin A varied inversely with the size of dose of all-trans vitamin A and directly with the size of dose of neovitamin A. The significance of these results is discussed.

4.89

phases will react and exchange with one another. Pressure, temperature, bubble size and number as well as the chemical nature of both will determine how much gas is dissolved in the liquid. The most critical activity is probably that which takes place between liquid and solid. At this interface occur most of the exchanges and reactions categorized as activation and depression, desirable or undesirable. Here all the properties of both solid surfaces and solutions are displayed and the complete definition of even the simplest of the systems concerned is extremely difficult.

With few exceptions, mineral surfaces are effectively hydrophilic and they can only be made to exhibit a preference for the gas phase if they are coated with a hydrocarbon. This is supplied by a reagent called a collector whose structure provides a polar group for attachment to the mineral interface and a nonpolar hydrophobic group. A soluble collector is usually employed and is introduced into the system by way of the liquid phase. Light, insoluble, nonpolar oils can be used as carriers for polar-nonpolar collectors, which are readily dissolved in them. In Sweden, great improvements have been effected in the flotation of fine-grained iron ores with fatty acids dissolved in fuel oil and fed as an emulsion.

By another method, the collector is added directly to the gas-solid interface. The Mines Branch in Ottawa has recently been experimenting with the use of tall oil fed directly to a dry grinding ball mill. Still another route is by way of the gas phase and thence to the gas-solid interface. This idea arose as a development of a dry-grinding system which employs air classification. The collector may be added to the airborne suspension as a very fine spray or fog. A fifth route is via the liquid-gas interface. Taggart attributes considerable influence in bubble attachment to the accidental presence at the bubble surfaces of insoluble oils and greases used in the lubrication of mining and milling machinery--especially in the froth column.

6.193

of these diets was, respectively, 27.1 and 30.1 percent. Both diets contained an excess amount of protein in relation to energy content.

A mixture containing 50 percent distillers dried solubles, 25 percent fish solubles, and 25 percent dried whey product, hereafter designated as UGF (unknown growth factor) mixture, and a liver extract were used as supplemental sources of unidentified chick growth factors. The ash included in diet A as a supplement was obtained by burning the UGF mixture at 525° C. until a light gray ash was obtained. An average quantity equivalent to 12 percent UGF was fed as ash in diet A.

Results.--As a supplement to the basal diet, intact UGF mixture promoted markedly greater growth than did an equivalent amount of UGF mixture in the form of an ash. The weight gain from the intact UGF mixture was in the range 13.7 to 31.7 percent, averaging 22.3 percent. The gain per unit of feed consumed improved to the extent of 7.3 percent. According to the authors, the UGF mixture contains an unidentified organic factor or factors that are required directly or indirectly for chick growth. In some unexplained manner, this factor renders the zinc in the UGF mixture more available to the chick.

The results of two experiments on the unidentified growth factors present in liver extracts show that the addition of 1.5 percent of liver extract to basal diet B promoted a striking increase in growth. In contrast, an amount of ash from liver extract equivalent to that in the intact liver extract failed to stimulate a significant increase in growth. When the ash from the UGF mixture was included in the basal diet in an amount equivalent to the quantity of the intact UGF mixture supplied in the previous group of experiments, a significant increase in growth ($P < 0.01$) occurred that was approximately equal to that obtained with the intact liver extract. A still further increase in growth was obtained by adding the intact UGF mixture or a combination of UGF mixture, ash, and liver extract to the basal diet. This increase in growth was also found to be significant ($P < 0.05$). The results suggest (1) that the ash from the UGF mixture stimulated chick growth by increasing the dietary zinc and (2) that the liver extract and the UGF mixture stimulated chick growth because of the presence of unidentified organic substances. The gain in weight promoted by the sources of unidentified growth factors ranged from 4.38 to 14.28 percent, averaging 8.55 percent.

6.190

high-fat starter diets to 5 weeks of age and low-fat pelleted diets for the balance of the trial. Other pens of chicks were started on low-fat pelleted diets and changed to high-fat mash diets at 5 weeks of age.

At 8, 10, and 12 weeks, 50 chicks from each pen were processed in a commercial dressing plant and yields were calculated on each group. Body weight and feed consumption were recorded at 5, 8, 10, and 12 weeks. All remaining birds were weighed at 5, 10, and 12 weeks; whereas only the 50 chicks removed from each pen for processing were weighed at 8 weeks.

Results.--The results of this trial are consistent with those of previous reports from this station concerning the relative value of low-fat pelleted and high-fat mash broiler diets. No differences were obtained when broilers were changed from one type of diet to another type of diet at 5 weeks of age.

The addition of 2.5 percent of condensed fish solubles to simplified corn-soybean meal diets failed to improve the growth rate of the chicks. The addition of pyridoxine, biotin, folacin, ascorbic acid, and additional menadione sodium bisulfite to the diets also failed to improve growth.

6.132 SCREENING BEFORE MILLING OF FISH MEAL REDUCES THE PROPORTION OF FINE PARTICLES

Duncan, R. M.
Food Industries of South Africa 12, No. 3, p. 24 (Aug. 1958) (In English)
World Fisheries Abstracts 10, 43-44 (May-June 1959)

Analyses were carried out to determine whether or not screening before milling produces a coarser meal than is obtained without screening. During the storage and handling of bagged fish meal, fine particles are liable to sift through the hessian, resulting in losses to the manufacturer. Previous work had shown that the most important single factor in such loss was the particle size composition of the meal. In an endeavor to eliminate this waste, one factory passed the unmilled meal en route to the mill over an 8-mesh woven wire screen, the coarser particles retained by the screen going to the mill and the undersize particles bypassed. To determine how effective this screening process is in reducing the proportion of fines, losses through seepage, and the tendency of the meal to form lumps under compression, 3 series of tests were carried out.

Series I. Materials and methods.--Samples were drawn from 3 bags of unscreened whole meal from one day's production, and from 3 bags of screened whole meal from another day's production, and the samples were screen analyzed using a set of 12 Tyler Standard Screens. The fraction retained by the screens up to and including 65-mesh was kept separate from that which passed through the 65-mesh, and these fractions as well as aliquots from the complete sample, were analyzed for moisture, protein, and fat. There is no significant difference between the moisture or protein content of the fine and coarse fractions (see Table 1, Card 2). In ordinary meals the coarse fraction contains a larger proportion of bone and scales with a low protein content, which tends to lower the protein value of this fraction. If, however, an appreciable amount of condensed solubles is held back in this fraction, as was observed, the protein content will be raised. The screen analysis also showed that

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 ABSTRACTER: J. S. Dunn

6.37 SEAWEED FOR FOOD--SOUTH WALES LAVERBREAD INDUSTRY

Anonymous
Food Manufacture 34, 443-444 (November 1, 1959)

Introduction.--The term "laver" is now generally applied to various marine algae as a trade name for the edible species of seaweeds. Several of these edible species have been used as a food by man for many centuries.

In South Wales, the laverbread industry is of great antiquity. The bulk of the red seaweed, porphyra, used in the manufacture of laverbread is now imported from coastal regions outside of Wales because of local sea pollution. The only local weed collected is boiled in small quantities by villagers for consumption at home. The baking of laverbread by individuals is rapidly dying out and is being replaced by bulk manufacture for distribution to markets and shops. The supply of seaweed required for this large-scale manufacture of laverbread is obtained from the coast line of Cumberland and Cornwall in England, Stranraer and Dunbar in Scotland, Southern Ireland, and southwest Wales. M. A. Hampson, of the Fisheries Laboratory of the Ministry of Agriculture, Fisheries, and Food at Lowestoft, has recently published the results of an investigation of the laverbread industry and also of the laverweed. Mr. Hampson estimates that about 425,000 pounds of laverweed is now being supplied annually to the South Wales laverbread manufacturers. Fifty percent of this weed comes from Stranraer, 20 percent from Cumberland, 8 percent from Cornwall, 8 percent from Barrow, and the remainder from Dunbar, Ireland, and North and South Wales. The Stranraer product is actually collected along the east coast of Ireland in the vicinity of Port Patrick and along the west side of Luce Bay, at Port William and Monreith Bay. The small quantity collected in South Wales comes mainly from the Milford Haven area. This laverweed is supplied to 13 establishments in and near Swansea. In recent years, markets for laverweed have been extended to a few English cities and towns, including Birmingham, Coventry, Bristol, Reading, Slough, and

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 ABSTRACTER: Martin Heerdt

6.195 OPTIMUM LEVEL OF MENHADEN FISH MEAL AND SOLUBLES AS SOURCES OF GROWTH FACTORS IN BROILER DIETS

Anonymous
Commercial Fisheries Review 21, 16-18 (October 1959)

In a broiler feeding experiment conducted at the University of Delaware, a study was made of the response obtained by the use of fish meal and condensed fish solubles in a corn-soy diet not otherwise supplemented with methionine.

Experimental.--Selected, day-old White Rock cockerels were allotted randomly to 20 groups of 50 chicks each. The chickens were housed in floor pens at the poultry farm of the University of Delaware. The feed consumed by each chick and the weight of each chick were determined at the end of 8 weeks.

The test diets were prepared from a basal mash consisting of ground yellow corn, soybean meal, corn gluten meal, alfalfa meal, vitamin premix, salt, and a trace mineral mix. The experimental diets were made from this mix by adding menhaden fish meal, alone or in combination with condensed fish solubles. Each varying level of fishery product was prepared in duplicate to permit the feeding of paired diets containing different levels of total protein, but with the same level of fish meal or fish meal and solubles. The diets were individually balanced with corn meal, soybean meal, fat, and bone meal to formulate comparable diets containing either 22 percent or 26 percent total protein and 1,050 Calories of productive energy per pound. No supplementary methionine was added to these diets.

In each experimental series were included a control diet that contained no fish meal and solubles and three diets that contained only fish meal as an added supplement--one each with 2.5, 5.0, and

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 ABSTRACTER: Kathryn L. Osterhaug

6.55 FEED FORMULATION UTILIZING A HIGH-SPEED DIGITAL COMPUTER

Anonymous
Commercial Fisheries Review 21, 19-21 (October 1959)

Because feed manufacture is now a scientific industry that utilizes automation and because feeds now contain a great number of ingredients, each of which provides essential nutrients, opportunities exist for the application of high-speed calculations.

Each ingredient used in compounding a feed has a definite cost at any specific time. These costs vary substantially at different times of the year and in different areas of the country. Digital computers have made possible the rapid calculation of least-cost formulas through the application of linear programming techniques that can assist the nutritionist both to formulate least-cost feeds and to check the analyses of complex combinations of ingredients.

One of the most important types of ration being formulated today is the broiler, chick, or turkey starter ration. In most areas, corn- and soybean-oil meal form the basis for these rations: The corn and soybean-oil meals are supplemented by the addition of known vitamins, minerals, fats, and drugs. The New England College Conference Broiler Starter is typical of a highly efficient broiler ration that meets the generally accepted standards for a top-quality ration.

If the fish meal is left out of the New England College Conference Broiler Starter, substitutes based on what is known about the nutritional requirements of chicks, must be used to produce a ration with approximately the same nutritional content.

The digital computer can be used to calculate the cost of replacing the fish meal. Fish meal

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 ABSTRACTER: Kathryn L. Osterhaug

SCREENING FISH MEAL

MENHADEN MEAL AND SOLUBLES FOR BROILERS

SEAWEED FOR FOOD

FEED FORMULATION

6.195

7.5 percent by weight. The six remaining diets in each series contained the fish meal and solubles in combination. Three of these diets contained a level of 2.5 percent fish solubles by weight--one each with 2.5, 5.0, and 7.5 percent fish meal. The last three diets contained a level of 5.0 percent fish solubles by weight--one each with 2.5, 5.0, and 7.5 percent fish meal.

Results.--(1) In the 22-percent protein diet, all levels of fish meal gave a significant improvement, (2) the condensed fish solubles gave a response which was additive over the fish meal, and (3) the 26-percent protein basal ration gave much better growth than the 22-percent basal ration. However, the 22-percent ration with 5-percent fish meal and 4.8-percent fat gave equal growth and better feed conversion than the 26-percent basal with 8-percent fat. The responses from fish meal and condensed fish solubles were not as great on the 26-percent diet as the 22-percent diet insofar as growth was concerned, but they did show improvements in feed conversion.

The data collected indicates that fish meal is of the greatest value when used with low protein rations. This is logical because the quality of the protein becomes more important when the total protein content is low.

6.55

can be replaced only by restoring all of the nutritive values that the meal normally supplies.

6.132

the process of screening before milling eliminated a large percentage of fine material. Thus 43.2 percent of the unscreened sample passed through 80-mesh and 23.7 percent through 150-mesh whereas with screened meal the corresponding figures were 13.1 percent and 2.7 percent.

Series II. Dusting.--Bags of unscreened and screened meals were dropped 20 times from a height of 2 ft. (0.61 m.). The amount of screened meal sifting through the bags was much less than the amount of unscreened meal (see Table 2, Card 2).

Series III. Lumping.--Tests showed that pellets made from screened meal needed less superimposed weight to cause them to collapse than did pellets made from unscreened meal.

Conclusion.--The results indicate that screening before milling reduces the proportion of fine particles that would be present in the meal after normal milling process. It also reduces sifting of the fine particles from hessian bags and the formation of lumps in the bagged meal.

6.37

Bournemouth, where Welsh communities have appeared.

Processing.--Laverweed is first thoroughly washed to remove all sand and foreign matter. The more tenacious sand is removed from twisted sections and knots by hand. This cleaning is extremely important, as the presence of any sand in the finished product is highly detrimental. The weed is then boiled for 12 hours in 6-hundredweight capacity copper boilers. Salt and water are added prior to boiling at the rate of 3 pounds of salt and 20 pounds of water per hundredweight of laverweed. The special technique, which has been acquired after years of experience, is handed down from generation to generation by families engaged in this business.

Spring-grown laverweed is tender; whereas winter-grown laverweed is tough, therefore, each season's weed requires a totally different treatment; When the laverweed is sufficiently cooked it is removed from the boiler and spread out on a stone or slate slab to cool. After the weed has been allowed to cool for about 12 hours, it is minced, and coloring matter is added to bring the weed to a standard color.

The final product made from laverweed is a shiny gelatinous mass that has a pleasant flavor of the sea and is called laverbread. Laverbread is prepared for eating by being warmed in fat. Sometimes laverbread is made up into small cakes coated with oatmeal. Laverbread normally takes the place of eggs, as a breakfast dish. Consumers have great faith in its qualities as a source of iodine in goiter treatment and as a dietary source of iron and other trace minerals. It also is of value as a mild laxative. In the Swansea market at the end of the week, there are several stalls where only laverbread is sold. It is also retailed by the cocklewomen of Penclawdd on the weekend rounds of the Welsh valleys.

6.190 COMPARATIVE VALUES OF DIFFERENT FISH MEALS AND FISH FACTORS IN BROILER FEEDS

Stephenson, E. L. and Barton, Lionel
Arkansas Farm Research 8, No. 4, 12 (July-August 1959) (Arkansas Agricultural Experiment Station, Fayetteville)

During recent years the supply of fish meal and fish solubles has decreased while the demand has increased. This has resulted in an increased price, as well as a shortage of supply, of some of the more popular products. To circumvent these difficulties certain soybean meal processors have attempted to blend fish solubles or fish hydrolyzates with soybean meal, to obtain a satisfactory replacement for fish meal. Also, new species of fish have been studied as feed for chicks. The experiments reported here were designed to study the nutritive value of certain of these products.

The experimental fish meals were added to the basal diet (Table 2, see over) at the expense of the fish meal listed in the formula. The "Fish-En-Soy" was added to the formula at the expense of fish meal, soybean meal, and corn on an equi-protein basis. In the first experiment each diet was fed to four pens of 10 chicks each and the chicks were maintained in electrically heated battery brooders to 4 weeks of age. In the second experiment each diet was fed to two pens of 200 chicks each. The birds were maintained on rice hull litter in floored pens for 9 weeks. In both experiments Cornish X White Rock unsexed chicks were used. The experimental diets and tap water were supplied ad libitum. Analysis of the data obtained in Experiment 1 revealed no statistically significant differences in respect either to body weight gain or to efficiency of feed utilization.

In Experiment 2, also, body weight means did not differ significantly. However, when the efficiencies of feed utilization were analyzed, diets 1 and 3 were found to be significantly more efficient in promoting growth than were the other diets. Diet 3 was significantly more efficient than any diet

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8.51 CHEMICAL STUDIES ON THE HERRING (CLUPEA HARENGUS) II. THE FREE AMINO-ACIDS OF HERRING FLESH AND THEIR BEHAVIOR DURING POST-MORTEM SPOILAGE

Hughes, R. B. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 10, 558-564 (October 1959)

Introduction.--In an earlier paper (J. Sci. Fd. Agric. 10, 431 (1959)), the author described and illustrated some changes that occur in the trimethylamine oxide and volatile base fraction of herring flesh under various conditions. In the present paper he has extended his study to the free amino acids including taurine (2-aminoethanesulphonic acid). Shewan (1953) examined the composition of an aqueous alcohol-extractible portion of the flesh of the herring by using displacement chromatography on ion-exchange resins coupled with paper chromatography. As a result of his study the following amino acids were identified in approximate order of decreasing concentration: histidine, lysine, glycine, alanine, serine, threonin, glutamic acid, proline, leucine, aspartic acid, and valine. Paper chromatography has been applied quantitatively to a study of the extractible amino acids of cod muscle by Jones (J. Sci. Fd. Agric. 6, 3 (1955)). Essentially, the same technique was applied in the present study.

Preparation of extracts for paper chromatography.--Filleted or eviscerated herring were minced, and a 20-gram sample was extracted with 64 milliliters of absolute alcohol in a high-speed homogenizer and subsequently three times with 50 milliliters of an ethanol-water mixture, 4-to-1 volume-for-volume. Before the bulked extracts were made up to 250 milliliters with the 4-to-1 ethanol-water mixture, the water content of a separate 10-gram sample of minced tissue was estimated by azeotropic distribution with toluene in a Dean and Stark apparatus. A requisite volume of absolute ethanol was then added to ensure that the final volume of extract contained alcohol and water in the correct proportion. The extract was then filtered and stored at -20° C. for subsequent analysis.

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ABSTRACTER: Martin Heerdt

7.51 EVALUATION OF PROTEIN IN FOODS III. A STUDY OF BACTERIOLOGICAL METHODS

Rogers, C. G.; McLaughlan, J. M.; and Chapman, D. G.
Canadian Journal of Biochemistry and Physiology 37, 1351-1360 (November 1959)

Introduction.--Current emphasis on the importance of protein in the diet has pointed to the need for a simple, rapid, and inexpensive method to evaluate the nutritive value of protein. Halevy and Grossowicz (1953), using a strain of S. faecalis, measured the nutritive value of egg albumin, gelatin, gluten, and zein in relation to casein after in vitro digestion of the proteins with a crude preparation of pancreatic proteinase. This method was based on the assumption that the growth of the test organism is dependent upon the pattern of amino acids available in the protein hydrolyzate. For a limited number of proteins, results agreed with values that had been determined by animal assay and reported in the literature. These methods were not satisfactory as general procedures to evaluate the proteins in natural foods.

This paper describes the results of an investigation of microbiological methods for the measurement of nutritive value of protein in a variety of foods of both plant and animal origin. The methods were evaluated by comparison with a Protein Efficiency Ratio value determined by a standardized rat growth assay.

Materials and methods.--Enzyme hydrolyzates of foods were prepared by a modification of the procedure of Teeri et al. (1954). Acid hydrolyzates of protein foods were prepared by the method of Horn and Blum (1956) for the assay of cystine in foods. Specifically, a sample containing 0.5 gram of protein was refluxed for 2 hours with 60 milliliters of 20 percent hydrochloric acid.

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ABSTRACTER: Martin Heerdt

8.59 CHANGES IN PURINE NUCLEOTIDES OF RED LATERAL MUSCLE OF RAINBOW TROUT

Saito, Tsuneyuki; Arai, Ken-ichi; and Yajima, Toshikatsu (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Nature 184, 1415 (October 31, 1959)

Introduction.--The authors in reporting on changes in the acid-soluble nucleotides of carp muscle in 1958 and 1959 found that inosinic acid accumulated as a result of slow freezing. This change was observed in the red lateral muscle and in the dorsal muscle of rainbow trout by the authors through the use of ion-exchange chromatography. Enzymic activities of the red lateral muscle affected the breakdown of nucleotides more than did the enzymic activities of the dorsal muscle.

Experimental.-- Fish were caught alive with a net, decapitated, skinned, filleted immediately, and stored at 0° C. for several days. Two grams of muscle was dissected from the red lateral or dorsal parts of the fillet and ground by hand in a mortar in 20 milliliters of 4 percent cold perchloric acid solution. The extract was filtered and 10 milliliters of the filtrate was used for analysis. Nucleotides and nucleosides were separated by the hydrochloric acid gradient elution system on 'Amberlite IRA-400' as described in earlier papers by the authors.

Results.--Concentrations of the purine compounds found in rainbow trout muscle after various time intervals are shown in table 1 (see over). Two characteristic differences are apparent when the tabulated data are compared. Specifically, larger total amounts of purine compounds and, especially, nucleotides are present in dorsal muscle than in red lateral muscle. In red lateral muscle, a rapid splitting of inosinic acid occurs with the passing of time; whereas in dorsal muscle an

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ABSTRACTER: Martin Heerdt

FISH MEAL FOR BROILERS

BACTERIOLOGICAL EVALUATION OF PROTEIN

FREE AMINO ACIDS OF HERRING

PURINE NUCLEOTIDES OF RAINBOW TROUT

7.51

In assays with acid or enzyme hydrolyzates, cultures were incubated for 72 hours at 33° C. Growth was then measured by titration with 0.1 N NaOH to pH 7.0 with a Beckmann Model G pH meter. The extent of digestion of protein in foods after enzyme or acid hydrolysis was determined by the formol titration method of Melnick and Oser (1949). The method of Halevy and Grossowicz (1953) was used to determine the order in which amino acids limit the growth of the test organisms in the hydrolyzates.

Lysine, cystine, and methionine were estimated in the acid hydrolyzates of foods by microbiological assay employing L. mesenteroides with hydrolyzed whole egg powder as the reference standard. Lysine and methionine were determined by the method of Steele et al. (1949) and cystine by the procedure of Horn and Blum (1956). The rat growth assay of Chapman, Castillo, and Campbell (1959) was used to determine the Protein Efficiency Ratio value of each food sample.

Results. -- Microbiological methods for the determination of protein quality were evaluated by comparison with Protein Efficiency Ratio values determined by a standardized rat growth assay. With Streptococcus faecalis A.T.C.C. 9790, autolysis occurred in media containing hydrolyzates of proteins deficient in lysine. This autolysis was responsible for results that did not agree with Protein Efficiency Ratio values. In methods employing Leuconostoc mesenteroides P-60 A.T.C.C. 8042, growth was influenced only by the most limiting amino acid relative to the requirements of the test organisms.

Results with enzyme hydrolyzates showed poor correlation with Protein Efficiency Ratio values; whereas, results with acid hydrolyzates showed good correlation with Protein Efficiency Ratio values for cereal proteins. A difference in amino acid requirements was responsible for the lack of agreement between the Protein Efficiency Ratio values and the values obtained from microbiological methods based on the growth of L. mesenteroides, particularly for legumes and foods of animal origin. The authors concluded that microbiological assay methods, which have been proposed for protein evaluation, are unsatisfactory as screening procedures for the evaluation of protein in foods.

6.190

except diet 1, and in this case the difference approached statistical significance. It was not possible to determine from these data whether this improvement in feed utilization was due to content of essential amino acids, unidentified factors, or a combination of the two. More work is needed to determine the reason for this greater efficiency in feed utilization.

Table 2. --Comparative feeding values of different fish products for broilers

Supplement to basal diet	Av. weight	Lbs. feed per lb. gain
Experiment 1, birds fed to 4 weeks	Grams	
5% Norwegian herring meal (Fulmeal)	443	1.69
5% croaker meal (whole fish)	435	1.67
5% experimental fish meal B	454	1.65
5% experimental fish meal C	441	1.81
Experiment 2, birds fed to 9 weeks	Lbs.	
1. 5% South African pilchard meal (Fulmeal)	2.81	2.33
2. 5% Norwegian herring meal (Fulmeal)	2.76	2.39
3. 5% croaker meal (whole fish)	2.84	2.27
4. 5% experimental fish meal B	2.72	2.37
5. 5% experimental fish meal C	2.82	2.42
6. 10% "Fish-En-Soy"	2.70	2.37

8.59

accumulation of inosinic acid occurs. As a result, the amounts of inosine and hypoxanthine in red lateral muscle increase rapidly.

Table 1. --Changes in the purine compounds found in rainbow trout muscle

Kind of muscle	Compound found	Purine compounds in μ moles of wet muscle				
		0 hr.	3 hr.	6 hr.	24 hr.	72 hr.
Dorsal	Hypoxanthine			0.14	0.23	0.58
	Inosine	0.00	0.29	0.63	1.02	1.58
	Adrenosine monophosphate	0.42	0.17	0.14	0.17	0.20
	Inosinic acid	3.36	4.23	6.30	6.09	5.42
	Adenosine diphosphate	1.04	1.11	0.30	0.35	0.35
	Adrensine triphosphate	3.53	2.10	0.48	0.17	0.08
	Total	8.53	7.90	7.99	8.03	8.21
Red lateral	Hypoxanthine	0.35	0.17	0.52	0.85	1.25
	Inosine		0.53	1.90	3.11	3.42
	Adrenosine monophosphate	0.12	0.20	0.17	0.12	0.15
	Inosinic acid	1.07	3.21	1.86	1.34	0.62
	Adrenosine diphosphate	0.93	0.44	0.14	0.30	0.30
	Adenosine triphosphate	3.39	1.30	0.00	0.53	0.51
	Total	5.86	5.85	5.85	6.25	6.26

8.51

Paper chromatography of amino acids. -- Two-way ascending chromatography was carried out on 12-inch square sheets of Whatman No. 1 filter paper with phenol-ammonia followed by collidine as solvents. The freeze-dried sample of extracted amino acid was dissolved in 400 μl of distilled water, and a suitable aliquot (4 to 10 μl) was applied in duplicate to the paper with a micrometer syringe. The amino acids on the developed chromatograms were located with ninhydrin and the purple color that had been developed was extracted and estimated as described by Jones (1955). Histidine, which gives a grey rather than a purple color with ninhydrin, could be satisfactorily determined.

Experiments carried out by the present author were in agreement with the results obtained by Shewan (1955). Arginine was identified by paper chromatography as a further minor component.

Isolation of taurine. -- A 4-to-1 ethanol-water extract from 120 grams of fresh herring flesh was passed through a column of sulphonated polystyrene (H^+ form). The eluate was retained and passed on to a column of Dowex-2 (100 to 200 mesh OH^- form, 15 x 1.2 centimeters). After the alcohol had been washed out from the column with carbon-dioxide-free distilled water, displacement was carried out with 0.1 normal HCl. A single 30-milliliter fraction that was collected when the eluate showed a positive reaction to ninhydrin was evaporated to dryness, and the residue was recrystallized twice from ethanol-water. Eighty milligrams of a white crystalline solid (melting point 327° to 328° C.) was obtained.

Results. --Seasonal variation in the free amino acids in herring was determined; histidine and taurine were, quantitatively, the most important. No correlation was found between sexual maturity and content of total or individual amino acids. In post-mortem spoilage the amount of taurine remained constant, whereas the amount of histidine, after a slight initial increase, dropped to zero. Histamine was detected 40 to 50 hours after death. Three other imidazole-like compounds were also detected. Leucine, valine, alanine, glycine, threonine, and glutamic acid increased; whereas lysine and serine decreased. Aspartic acid and tyrosine appeared after 40 hours; arginine and methionine appeared after 48 hours.

8.42 SOME ACTIVATION ANALYSES OF SIX TRACE ELEMENTS IN MARINE BIOLOGICAL ASHES

Fukai, R. and Meinke, W. W. (University of Michigan, Ann Arbor)
Nature 184, 815-816 (September 12, 1959)

Systematic knowledge of the abundance of trace elements in marine organisms is far from complete. Most currently accepted values have been determined by spectroscopy or flame photometry, but for a number of elements these methods leave much to be desired. The method of activation analysis not only increases the sensitivity for many trace elements but also eliminates the necessity for running 'blank' analyses on the reagents since small amounts of impurities contained in the reagents will not be measured.

Experimental. -- Activation analyses have been carried out for vanadium, arsenic, molybdenum, tungsten, rhenium and gold in several different types of marine ashes using the Ford Nuclear Reactor of the University of Michigan and associated facilities of the Michigan Memorial Phoenix Project. The ash samples were prepared by igniting dried marine organisms in a quartz crucible at a temperature below 550° C. About 500 mgm. of ash were used for each analysis except for vanadium and molybdenum, where 50-100 mgm. and 200-250 mgm. of the ash were used, respectively.

Samples were irradiated in the reactor for periods of 10 minutes to 15 hours, the length of irradiation depending on the isotope to be measured. When short-lived radio-isotopes were to be measured the sample was analyzed immediately, otherwise it was set aside for a while to cool to reduce the radiation encountered in the processing. A chemical separation of the element in question was then performed and the purified radio-isotopes measured by a 3 in.x 3 in. NaI(Tl) γ-ray scintillation detector coupled with a 100-channel pulse height analyzer with dual memories.

Nuclear properties of the isotopes measured, irradiation conditions, separation methods, and experimental sensitivities obtained are summarized in tabular form. The abundance of the elements in the ashes is given. The overall errors accompanying these values should rarely exceed ±30 percent.

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Reprinted in part

8.8 CHEMICAL INDICES OF DECOMPOSITION IN HADDOCK

Hillig, Fred; Shelton, L. R., Jr.; and Loughrey, J. H. (Food and Drug Administration, Washington 25, D. C.)
Journal of the Association of Official Agricultural Chemists 42, 702-708 (November 1959)

Introduction. --The deteriorative changes that take place in raw fish are principally a progressive proteolysis of the muscle tissue brought about by the action of micro-organisms and, to a lesser degree, by autolytic enzymes. This progressive deterioration has been classified as follows into five stages of the raw fish in "Chemical Indices of Decomposition in Cod," J. A. O. A. C. 41, 763 (1958): Class 0, the first stage after death, consists of perfectly fresh fish. Class 1, the second stage after death, consists of fish that have a very slightly fishy odor but are still good fish. Class 2, the third stage after death, consists of fish that have persistent odor, indicative of decomposition. Class 2, consists of fish that have a noticeable odor indicative of distinct and unmistakable decomposition. Class 4, consists of fish that have a putrid, extremely foul odor and are in a stage of advanced decomposition.

Experimental. -- The procedures used to prepare and analyze the packs of haddock discussed in the present paper are the same as those described for cod under Preparation of Packs and Examination of Packs, in the previous paper mentioned above.

Preparation of the progressive decomposition packs involved filleting the fish, grading each fillet, packing by grade into individual boxes, freezing the packaged fillets in a plate freezer, and storing the frozen pack. After a period of frozen storage, organoleptic examination revealed that some of the fillets had gone from the Class 1 designation, recorded for them after filleting, to Class 2 as a result of the delay between filleting and freezing. These particular fillets illustrate a commercial problem that can arise with fish kept in ice for 7 to 16 days. Such fish may decompose

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ABSTRACTER: Martin Heerdt

9.16 USE OF PLASTIC SHEETS FOR CONVERSION OF SOFT MUDDY BOTTOMS INTO OYSTER BEDS

Loosanoff, V. L. (U. S. Bureau of Commercial Fisheries, Milford, Connecticut)
Commercial Fisheries Review 21, 45-47 (November 1959)

The bottom areas in many estuarine regions are too soft to support oysters. Thousands of bushels of oyster shells must normally be distributed on each acre in order to sufficiently harden the bottom in these areas. The expense of such an undertaking renders this method of treating oyster grounds virtually impractical.

The author has found that the problem can be solved by covering the soft bottom areas with thin sheets of plastic material such as polyethylene. This material serves as a support for oyster shells or other set collectors, seed oysters, or spawners. Polyethylene, which was used by the author in his experiments, has been found to be extremely durable and is inexpensive.

In the spring of 1958, an experiment was undertaken on the mud flats in Milford Harbor where a polyethylene sheet (6 mils thick and 20 feet wide) was spread on the bottom in such a manner that half of it was above and half below the mean low-water mark. Soon after that, large quantities of oyster shells, loose and in special chicken-wire bags, were placed on the polyethylene. An extremely heavy set of oysters occurred on the shells resting on the plastic. This successful oyster set corroborated earlier laboratory observations showing the lack of adverse effects of polyethylene on oyster larvae and set.

Continued observations indicated that the polyethylene sheet withstood seasonal changes very well and that even the severe winter of 1958 to 1959, when the tidal flats froze frequently and large quantities of ice were formed in Milford Harbor, did not noticeably affect the plastic material. A

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ABSTRACTER: Kathryn L. Osterhaug

9.2 FISH AND SHELLFISH PURCHASES BY PUBLIC SCHOOLS WITH FOOD SERVICES, 1957-58

Hoofnagle, William S. and Anderson, Kenneth E.
Commercial Fisheries Review 21, 17-20 (November 1959)

The outlet for food in schools is an important segment of the institutional food service market. Further expansion is likely to occur in this outlet as school enrollments continue to rise and as new schools are built with modern cooking and cafeteria facilities. Today, approximately 60,000 of the 106,000 public schools in the United States offer some type of food service. Somewhat over 54,000 of these public schools participate in the National School Lunch Program. To be eligible to receive this assistance, schools must agree to operate the lunch room on a nonprofit basis; to serve meals that meet specified nutritional standards; and to serve the meals free or at a reduced price to children unable to pay.

Deliveries of all purchased and donated foods to a sample of 500 public schools were recorded over a 12-month period at 2-month intervals, beginning with July 1957 and ending with June 1958. The sample was divided into approximately six equal subgroups of schools, with invoices of deliveries taken in a rotating pattern to provide coverage in all months of the year to overcome seasonal factors. The value of deliveries was determined by using actual prices paid for food purchased by the sample schools and current market wholesale prices for donated foods. Information on the delivery invoices from the sample schools was tabulated for a 12-month period and projected to United States totals for deliveries and value on an annual basis.

The total value of foods, both purchased and donated, delivered to approximately 60,000 public elementary and secondary schools operating a food service between July 1957 and June 1958 amounted to $597 million, or $28 per capita, based on average daily attendance figures of slightly over 21 million pupils. About $505 million worth of food, or 85 percent of the total value of food, was purchased by the schools from local sources. The remaining portion, or approximately 15 percent of the total dollar

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ABSTRACTER: Kathryn L. Osterhaug

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rapidly during delays in processing. In the first heavily iced pack, fillets were cut daily for freezing and subsequent analysis.

Results. -- Heavily iced fish, which reached Class 1 in 4 days, could in some cases, be kept for periods of 11 to 12 days and still be satisfactory organoleptically and chemically. A day-by-day significant increase in any of the indices did not occur until the fish reached Class 2, or the stage at which they were no longer fit for human consumption. At this point, a several-fold increase occurred in most of the indices. Formic acid was not found until the fish had reached Class 2. Uniced fish decomposed rapidly. Their chemical indices were in the same range as those found for the heavily iced fish in each decomposition class. Ungutted fish that were held overnight at 78° F. before they were gutted and iced down reached Classes 2 and 3 in 8 days. If the fish had been iced throughout the entire experiment, this period would have been extended. After the 5th day of storage, most of the ice was removed from the fish so that decomposition could proceed more rapidly. In each of the packs, Class 0 fish contained small quantities of volatile acids (no determinable quantity of formic acid), succinic acid, volatile bases, alcohol, and trimethylamine. Even after the fish were held under the various conditions described, a significant increase in any of these indices did not occur as long as the fish remained in Class 0. Determinable quantities of propionic acid were not found in the progressive decomposition packs. Chemical indices obtained from bilgy haddock indicate that propionic acid is formed as a result of breakdown changes that take place in the fish held aboard the vessel under anaerobic conditions.

A study of the individual analyses of progressive decomposition packs of haddock leads to the conclusion that volatile acid number, formic and acetic acids, volatile bases, volatile amines, and trimethylamine show the highest degree of correlation with organoleptic judgment; whereas succinic acid and alcohol show less correlation.

8.42

Abundance of trace elements in marine biological ash (gm./gm. ash)

Sample	Japanese collection station	V	As
Ulva sp. (seaweed)	Enoshima, Sagami Bay	5.9×10^{-6}	5.4×10^{-6}
Ulva sp. (seaweed)	Urayasu, Tokyo Bay	1.33×10^{-5}	- -
Porphyra sp. (seaweed)	Chiba, Tokyo Bay	2.62×10^{-4}	- -
Tapes japonica (soft parts of clam)	Shore of Japan Islands	1.50×10^{-5}	$< 5 \times 10^{-8}$
Pandalus sp. (soft parts of prawn)	Vicinity of Japan Islands	1.1×10^{-6}	8.3×10^{-7}
Pneumatophorus japonicus (Mackerel) meat	Vicinity of Japan Islands	*	3.4×10^{-7}

Sample	Mo	W	Re	Au
Ulva sp. (seaweed)	*	1.3×10^{-7}	7.3×10^{-8}	9.3×10^{-8}
Ulva sp. (seaweed)	*	1.8×10^{-7}	4.6×10^{-8}	1.5×10^{-8}
Porphyra sp. (seaweed)	1.7×10^{-5}	- -	- -	- -
Tapes japonica (soft parts of clam)	- -	4.6×10^{-7}	6.4×10^{-8}	7.9×10^{-8}
Pandalus sp. (soft parts of prawn)	- -	$< 5 \times 10^{-9}$	$< 5 \times 10^{-9}$	4.6×10^{-9}
Pneumatophorus japonicus (Mackerel) meat	- -	$< 1.4 \times 10^{-8}$	$< 8 \times 10^{-9}$	2.6×10^{-9}

* Below detection limits.

9.2

value of commodities, comprised those donated directly by the Government from purchases made especially for school lunch or from stocks acquired under various price-stabilization programs.

During the survey period, July 1957 through June 1958, almost 28 million pounds of fish and shellfish were purchased by public schools having a food service. Based on an average daily attendance figure of a little over 21 million pupils in this category of public schools, about 1.3 pounds of fish and shellfish per child were available for consumption. Of the total quantity of fish purchased by this market outlet, almost 15 million pounds were in fresh or frozen form. From a volume standpoint, fish sticks were the most important item in the fresh and frozen category, accounting for almost 6 million pounds. Fish fillets accounted for slightly over 4 million pounds and fresh whole fish about 1.5 million pounds, with the balance made up of other fresh or frozen fish items. On a per capita basis, 0.7 pound of fresh and frozen fish and fish products combined were available for consumption in the schools serving food.

Slightly over 13 million pounds of canned fish moved into the school market between July 1957 and June 1958. Tuna was by far the most important canned fish item, accounting for almost 8 million pounds. It was followed by salmon, which represented slightly over 4 million pounds of the total for canned fish items. Bonito, sardines, and other canned fish items accounted for the balance of the volume of deliveries in this category. Shellfish was a relatively minor volume item in the school lunch program. Somewhat less than 200,000 pounds of shellfish items were delivered to these schools during the survey period.

The wholesale value of all fish and shellfish purchased by public schools with food services during the survey period amounted to almost $13 million, or 60 cents per child, based on average daily attendance. From the standpoint of monetary value, canned fish items accounted for about $7 million, or 32 cents per child. The value of tuna fish deliveries came to almost $4 million, salmon to somewhat over $2 million, and the balance was for bonito, sardines, and other canned items. In the fresh and frozen category, the wholesale value of all items amounted to $6 million, with fish sticks and fish fillets accounting for slightly over $4 million of the total. Fresh whole fish was relatively the least expensive item in this category. Results of the survey revealed that fish and fish products accounted for 2 cents out of each school food dollar.

9.16 (Cross Reference: 1.81)

year after the sheet was first placed in the water, the plastic showed no signs of deterioration and continued to support the heavy load of shells and oysters.

In addition to converting soft bottoms into usable ones, polyethylene sheeting can be used for still other purposes. For example, recent literature contains several remarks made by oyster biologists, especially the Japanese, concerning a gradual deterioration of good oyster bottoms after being used for some time. They ascribe this to the accumulation of molluscan waste products which gradually decompose, rendering the bottom toxic to oysters. Such areas could probably be restored to their former productivity by covering them with polyethylene sheeting or similar material, which would isolate oysters from the deleterious effects of polluted bottoms.

0.35 A STUDY OF THE CYTOCHROMES OF OCTOPUS VULGARIS LAM.

Ghiretti-Magaldi, Anna; Giuditta, A.; and Ghiretti, F. (Dept. of Physiology, Stazione Zoologica, Naples, Italy)
The Biochemical Journal 66, 303-307 (June 1957)

A method of preparing isolated particles from the muscle of Octopus vulgaris is described. Difference spectra of the particles show the presence of a cytochrome system composed of cytochromes a, a_3, b, and c. Enzymic oxidation of succinate and cytochrome oxidase activity have also been demonstrated in these particles.

0.35 BIOCHEMISTRY OF FISHES

Tarr, H. L. A. (Fisheries Research Board of Canada, Technological Station, Vancouver, B. C.)
Annual Review of Biochemistry 27, 223-244 (1958)
Studies 1958, from the Stations of the Fisheries Research Board of Canada, FRB 517 (1959) (Ottawa)

Topics reviewed include proteins, nonprotein nitrogen, nucleic acids and related compounds, phospholipides, enzymes, nutrition, and sterols of marine invertebrates. Two hundred and sixty-five references are cited.

0.36 THE NITROGEN METABOLISM IN FISH MUSCLE

Sorvachev, K. F. (M. F. Lomonosov State Univ., Moscow)
Chemical Abstracts 53, 20588f (November 10, 1959)

0.36 LOBSTER MUSCLE PHOSPHORYLASE: PURIFICATION AND PROPERTIES

Cowgill, Robert W. (Department of Biochemistry, University of Colorado School of Medicine, Denver 20)
Journal of Biological Chemistry 234, 3146-3153 (December 1959)

Phosphorylase a that was isolated from lobster muscle behaved as a homogeneous protein during ultracentrifugation and zone electrophoresis. Phosphorylase b also was isolated from lobster muscle as a protein of the same molecular size as phosphorylase a ($S_{20,w}$ = 9.0). Pyridoxal phosphate was bound to the phosphorylase (approximately 1 mole of pyridoxal phosphate per 100,000 grams of phosphorylase a); and, after treatment with acid ammonium sulfate, the enzyme required pyridoxal phosphate for activity.

0.36 THE CONVERSION OF LOBSTER MUSCLE PHOSPHORYLASE a TO b AND PHOSPHORYLASE b TO a

Cowgill, Robert W. (Department of Biochemistry, University of Colorado School of Medicine, Denver 20)
Journal of Biological Chemistry 234, 3154-3157 (December 1959)

An enzyme that was extracted from lobster muscle and extensively purified was found to catalyze the conversion of lobster muscle phosphorylase a to phosphorylase b.

0.38 STUDIES ON THE LIPOXIDASE IN FISH TISSUE III. LINOLEATE OXIDATION BY LIVER EXTRACT

Nagayama, Fumio and Ono, Toyoki
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 10, 853-857 (1959) (English abstract and figures)

Linoleate oxidation by extracts of mackerel liver and by hemin were measured manometrically. The oxidative activity of the liver extracts was lost by boiling, whereas hemin was not influenced by heat. Ordinary antioxidants inhibited the linoleate oxidation of liver extracts and hemin.

0.38 ADENOSINETRIPHOSPHATASE ACTIVITY OF PERCH SPERM FLAGELLA

Tibbs, J. (Univ. of Leeds, Engl.)
Chemical Abstracts 53, 18124c (October 10, 1959)

The adenosinetriphosphatase of perch sperm flagella in 0.1M borate buffer and a 2 millimolar adenosinetriphosphate were inactivated by $MgCl_2$ and $CaCl_2$.

0.38 ROLE OF LIPIDES IN ENZYME SYSTEMS

Polonovski, Jacques (Fac. med., Paris)
Chemical Abstracts 53, 20201f (November 10, 1959)

2.1121 ON THE MODEL EXPERIMENT OF THE BRITISH COLUMBIA MID-WATER TRAWL I.

Suzuki, Otohiko (Kyoto University, Maisuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 24, Nos. 6 and 7, 480-483 (1958) (In English)

A series of experiments were carried out with a 1/40 model of a British Columbia mid-water trawl. In these experiments, the relation between the size of the net mouth, the towing speed, and the hydrodynamic characteristics of the otter board were studied.

2.1121 OBSERVATIONS ON TRAWL-DOOR SPREAD AND A DISCUSSION OF INFLUENCING FACTORS

Wathne, Fredrick
Commercial Fisheries Review 21, 7-15 (October 1959)

In the course of population studies of King crab, Paralithodes camtschatica, in the southeastern Bering Sea, an otter trawl was used, and measurements of the trawl door spread were obtained. These data were examined to determine the effect of water depth, vessel speed, and total catch on door spread. When using a warp-scope ratio (the ratio of warp length to water depth) of 3:1, it was found that the spread of the doors was greater in deep water than in shallow water and that door spread appeared to decrease with increased vessel speed. Some indication that larger catches reduced door spread were also noted; however, this relationship was not strong, possibly because the catches experienced were not of a sufficient magnitude to affect the performance of the doors significantly. A theoretical explanation of the above phenomena is that for a given trawling apparatus the outward thrust or "lift" of the trawl door is determined largely by the degree of contact between the door and the bottom. It is theorized that the degree of contact is directly related to the direction of pull exerted on the door by the towing warp and that this is determined by scope ratio, vessel speed, and possibly by the size of the catch in the trawl.

GLOSSARY OF COMMON AND SCIENTIFIC NAMES OF FISH AND SHELLFISH*

Common name	Other common names	Scientific name
Alewife	Branch herring, big-eyed herring, river herring,	Pomolobus pseudoharengus
	Blueback, glut herring, shad herring	Pomolobus aestivalis
Anchovy		Engraulis mordax
Cod	Codfish	Gadus morhua (Atlantic)
		Gadus macrocephalus (Pacific)
Flounder:		
Gray sole		Glyptocephalus cynoglossus
Lemon sole		Pseudopleuronectes dignabilis
Yellowtail	Dab	Limanda ferruginea
Dab	Sea dab	Hippoglossoides platessoides
Blackback	Winter flounder	Pseudopleuronectes americanus
Fluke	Summer flounder, gulf flounder, flounder	Paralichthys species
'Sole'		Pleuronectidae and Bothidae species
'California halibut'		Paralichthys californicus
Haddock		Melanogrammus aeglefinus
Halibut		Hippoglossus hippoglossus (Atlantic)
		Hippoglossus stenolepis (Pacific)
Herring:		
Lake	Herring	Leucichthys artedi (Great Lakes, except Erie)
Round		Etrumeus sadina
Sea		Clupea harengus (Atlantic)
Thread		Clupea pallasii (Pacific)
		Opisthonema oglinum
Jack mackerel	Horse mackerel	Trachurus symmetricus
Lingcod	Cultus cod, blue cod, buffalo cod, ling	Ophiodon elongatus
Mackerel		Scomber scombrus (Atlantic)
		Pneumatophorus diego (Pacific)
Crab:		
Blue		Callinectes sapidus
Hard	Hard-shelled crab	Callinectes sapidus
Soft and peelers	Soft-shell crab	Cancer magister
Dungeness		Paralithodes camtschatica
King	Alaska king crab	Cancer irroratus (New England)
Rock		Cancer species (California)
Stone		Menippe mercenaria
Lobster:		
Northern		Homarus americanus (Atlantic)
Spiny	Sea crawfish, rock lobster	Panulirus argus (Atlantic)
		Panulirus interruptus (Pacific)
Shrimp	Prawn	Penaeus setiferus (South)
		Penaeus duorarum (Atlantic)
		Penaeus aztecus and Xiphopeneus kroyeri Gulf)
		Pandalus species (Atlantic and Pacific)
		Pandalopsis species (Pacific)
		Crago species (Pacific)

Common name	Other common names	Scientific name
Menhaden	Mossbunker, pogy, fatback	Brevoortia species
Mullet	Jumping mullet, striped mullet, silver mullet	Mugil species
Ocean perch:		
Atlantic	Rosefish, redfish, red perch	Sebastes marinus
Pacific		Sebastodes alutus
Pilchard	Sardine	Sardinops caerulea
Pollock	Boston bluefish	Pollachius virens
Rockfish	Rock cod, snapper	Sebastodes species (Pacific)
Sablefish	Black cod	Anoplopoma fimbria
Salmon:		
Atlantic		Salmo salar (Atlantic)
Pacific:		
Chinook or king	Tyee, spring	Oncorhynchus tshawytscha
Chum or keta	Fall, dog	Oncorhynchus keta
Pink	Humpback	Oncorhynchus gorbuscha
Red or sockeye	Blueback	Oncorhynchus nerka
Silver or coho		Oncorhynchus kisutch
Spanish mackerel	Mackerel	Scomberomorus maculatus
Tuna and tunalike fishes:		
Albacore	Longfin tuna	Germo alalunga
	---	Thunnus saliens
Bluefin	Horse mackerel	Thunnus thynnus
	---	Thunnus secundodorsalis
Bonito		Sarda sarda (Atlantic)
		Sarda chiliensis (Pacific)
Little	Bonito, albacore, false albacore	Euthynnus alletteratus
Skipjack	Striped tuna	Katsuwonus pelamis
Yellowfin		Neothunnus macropterus
Whiting	Silver hake	Merluccius bilinearis
Clam:		
Cockle		Cardium corbis (Pacific)
Coquina	Pompano shells	Donax variabilis
	Butter	Saxidomus nuttali (Pacific)
Hard	Little neck	Paphia staminea (Pacific)
	Round clam, cherrystone, quahog, little neck	Venus mercenaria (Atlantic)
		Venus mortoni (Florida)
Ocean quahog		Cyprina islandica
Pismo		Tivela stultorum (Pacific)
		Ensis species (Atlantic)
Razor		Siliqua patula (Pacific)
Soft	Soft-shell clam, sand clam, nannynose, maninose	Mya arenaria
Surf	Skimmer	Spisula solidissima
Oyster:		
Eastern	Cove	Crassostrea virginica
Pacific (introduced)	Japanese	Crassostrea gigas
Western	Olympia, native	Ostrea lurida
Scallop:		
Bay		Pecten irradians (Atlantic)
		Pecten aequisulcatus (Pacific)
Sea		Pecten magellanicus

* Taken from Fishery Statistics of the United States 1955. Each species listed was caught in excess of 10,000,000 pounds in 1955.

2.143 EXPERIENCE IN MEASURING THE CONDUCTIVITY AND DETERMINING THE HARDNESS OF WATER IN CONNECTION WITH ELECTROFISHING AND EVALUATION OF WATER

Buhse, G.
Der Fischwirt 8, No. 6, p. 160 (June 1958)
World Fisheries Abstracts 10, 19-20 (May-June 1959)

The strength of current of electrofishing gear must be adjusted to the water. If the current passing through the water is too weak, it has a frightening effect, and fish escape from the anode. If the current is too strong, the fish will be paralyzed and electrically killed instead of only being guided to the anode (electrotaxis). For selecting the appropriate strength of current, it is helpful to determine the resistance of the water to electricity. This is related to the total hardness of the water.

2.143 NEW TYPE OF TUNA HOOK IN ELECTROFISHING

Schultz, K.
Schiff und and Hafen 10, No. 9, p. 752 (Sept. 1958)
World Fisheries Abstracts 10, 21-22 (May-June 1959)

After briefly discussing electric fishing equipment, the author gives a detailed description of a new type of electric gear for tuna fishing that was developed in Gothenburg. The main feature of this equipment is that, at the moment of biting, the tuna receives an electric shock of some hundreds of amps, which stuns it for a period of seconds or minutes. During this time, the fish can be taken aboard and killed. With conventional fishing methods, the formation of lactic acid is increased by the struggling motions of the fish. This, however, cannot happen during electric fishing, and consequently, the meat is of better quality. The method is also much faster and the yield is increased by 150 to 200 percent of that obtained with conventional equipment.

3.12 PRESERVATION OF SHRIMPS

Roskam, R. T.
Conserva 6, No. 11, p. 278 (May 1958) Parts 1 and 2 (Zwarteweg 1, The Hague, Netherlands)
World Fisheries Abstracts 10, 37-38 (January-February 1959)

It is shown that the spoilage of boiled, brown shrimp (Crangon vulgaris) is caused by contamination with marine species of Pseudomonas after boiling. At 20° C. (68° F.), the keeping time of peeled, boiled shrimps that had been infected intentionally with marine spoilage bacteria was 1 day without addition of the preservative, 5 days with 0.5 percent benzoic acid, and 9 days with 1 percent benzoic acid.

3.12 PUTREFACTION OF AQUATIC PRODUCTS XXVI. SPOILAGE IN THE PRESENCE OF PRESERVATIVE 1.

Hibiki, Shigeyuki and Shimizu, Wataru (Kyoto Univ.)
Mem. Research Inst. Food Sci., Kyoto Univ. No. 16, 1-11 (1959)
Chemical Abstracts 53, 11700e (June 25, 1959)

Fish meat was cooked in test tubes with various preservatives and incubated at 30° to 45°. Large numbers of bacteria in the meat decreased the efficacy of the preservatives. Furaskin (nitrofurazone) and aureomycin at concentrations of 100 and 1000 parts per million, respectively, with sufficient heating kept the meat fresh for more than 20 days; lower concentrations of these two preservatives, sorbic acid at 2000 parts per million and vitamin K_3 kept at 1000 parts per million, could only keep the freshness for 1 week.

3.332 CHEMICAL STUDIES ON THE HERRING (CLUPEA HARENGUS) I. TRIMETHYLAMINE OXIDE AND VOLATILE AMINES IN FRESH, SPOILING AND COOKED HERRING FLESH

Hughes, R. B.
Journal of the Science of Food and Agriculture 10, 431-436 (August 1959)

(Abstract of this article appears under 8.8 page 17 - January 1960)

3.332 THE APPLICATION OF GLAZING AND LOW TEMPERATURES IN THE STORAGE OF FROZEN SPRAT

Piskarev, A. I.; Kaminarskaya, A. K.; and Lukyanitsa, L. G. (Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow)
Bulletin de L'Institut International du Froid, 10th International Congress of Refrigeration (Paris) 39, 892, 894 (1959)

The use of ascorbic acid inhibits the formation of peroxides; however, some off-flavor not characteristic of fish was noticed while tasting stored samples processed with ascorbic acid. On the basis of this study the authors recommended the following storage periods for glazed blocks of frozen sprat to be used in canning: 2 months at -18° C., 3 months at -25° C., and 4 to 5 months at -35° C.

3.338 ESTIMATION OF VACUUM IN UNOPENED CONTAINERS

Davis, E. G. and Elliott, A. G. L.
Food Technology 12, 473-478 (September 1958)

(Abstract of this article appears under 0.118 page 1 - February 1959)

3.338 PREVENTION OF ADHESION OF CANNED SALMON MEAT

Takahashi, Toyo-o and Takei, Makoto
Bulletin of Tokai Regional Fisheries Research Laboratory No. 24, 57-65 (June 1959) (English abstract)

Salmon meat (Oncorhynchus keta) was packed in cans coated inside with various materials. When the inside of a can was coated with silicon resin or polyvinyl alcohol, only a slight adhesion of meat, skin, and coagulated soluble protein occurred in the can. The minimum amount of silicon resin effective for precluding the adhesion was determined to be about 3 to 7 milligrams per 100 cubic centimeters of the can.

If the salmon meat is packed after immersion in 2 percent NaCl solution containing 0.5 percent acetic acid, 6 M urea solution, or M/10 sodium β-naphthalenesulfonate solution, the canned meat will show only a slight adhesion. Immersion of salmon meat in 1 percent sodium phosphate dibasic solution or sodium laurylsulfate solution accelerated the adhesion.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
ASHRAE Journal (formerly Refrigerating Engineering)
Biochemical Journal
Biochemistry (U. S. S. R.)
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Biochemistry and Physiology
Canadian Journal of Chemical Engineering
Canadian Journal of Chemistry
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmestic Industry
Federation Proceedings
Feed Bag
Feedstuffs
Fish Boat
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
Food Manufacture
Food Preservation Quarterly
Food Processing
Food Research
Food Technology
Frosted Food Field
Industrial and Engineering Chemistry
Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Poultry Science
Progressive Fish-Culturist
Quick Frozen Foods
Report of the Food Investigation Board (Great Britain)
Science
Seafood Merchandising
Trade News (Fisheries Department, Canada)
Western Canner/Packer
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above-listed publications are included. Biological papers are generally omitted.

3.4 CONTAMINATION OF FISH BY ARSENIC FROM SMOKE DERIVED FROM PRESERVED WOOD

Watson, C. C. (Dominion Lab., Wellington)
New Zealand J. Sci. 1, 369-72 (1958)
Chemical Abstracts 53, 12516e (July 10, 1959)

Controlled burning of sawdust from wood treated with arsenical preservatives caused the evolution of 8.6 percent of the arsenic in the timber.

3.4 OPEN DAY AT TORRY LABORATORY

Anonymous
World Fishing 8, 56-58 (August 1959)

(Abstract of this article appears under 9.4 page 19 - January 1960)

3.4 STORAGE OF CERTAIN FISH PRODUCTS IN CARBON DIOXIDE

Gabriel'yants, M. A.
Chemical Abstracts 53, 20607c (November 10, 1959)

4.61 ANTIOXIDANT TREATMENT OF RAINBOW TROUT

Bramsnaes, F.; Brennum, H.; and Sorensen, H. (Fiskeriministeriets Forsogslaboratorium, Copenhagen, Denmark)
Bulletin de L'Institut International du Froid, 10th International Congress of Refrigeration (Paris) 39, 894 (1959)

The effect of butylhydroxanisole (BHA), butylhydroxytoluene (BHT), and ascorbic acid on dressed rainbow trout was investigated. Ascorbic acid was used as a ½-percent solution in water, whereas a mixture of BHA and BHT was used in a water and groundnut-oil emulsion containing 0.15 percent BHA and 0.15 percent BHT. Dressed trout were dipped for 1 minute in the antioxidant solutions, packed, frozen, and stored at -10° C. Nondipped trout were used as a control. Examinations were made periodically over a period of 9 months. Treated samples were found to have better flavor and lower perioxide values than nontreated samples. In the concentrations used, ascorbic acid was more effective than was the emulsion that contained BHA and BHT.

4.61 ANTIOXIDANT FOR FISH

Tsuboi, Eitaro and Tsuboi, Takayuki
Japan 2832 ('59) Apr. 22.
Chemical Abstracts 53, 16413b (September 10, 1959)

2-Butyl-4-hydroxyanisole and 3,5-dibutyl-4-hydroxytoluene (100 grams) are mixed with 100 grams dried powder of sodium lauryl alcohol sulfate under heating and stirring and cooled, and the obtained mass is powdered to give the desired product. When H_2O or H_2O-glycerol is added in this process, a sirupy or liquid product is obtained.

4.91 COMPARATIVE STUDIES ON THE EFFECT OF DIETARY FATS ON SERUM CHOLESTEROL LEVELS

Hegsted, Mark (Harvard School of Public Health)
Federation Proceedings 18, Part II, 52-53 (July 1959)

4.91 LIVER MITOCHONDRIAL LIPIDES IN HYPERCHOLESTEROLEMIC RATS GIVEN POLYENOIC FATTY ACIDS

Hauge, Jens G. (Univ. Oslo, Norway)
Chemical Abstracts 53, 19090d (October 25, 1959)

4.91 DIETARY FAT AND CHOLESTEROL METABOLISM: EFFECTS OF UNSATURATION OF DIETARY FATS ON LIVER AND SERUM LIPIDES

Okey, Ruth; Lyman, M. M.; Harris, Anne G.; Einset, Betty; and Hain, Wm. (Univ. of California, Berkeley)
Chemical Abstracts 53, 20351c (November 10, 1959)

4.91 DIETARY FATS AND THE DIABETIC PATIENT

Kinsell, Laurance W.; Walker, Geoffrey; Michaels, George D.; and Olson, Florence (Highland Alameda County Hosp., Oakland, California)
Chemical Abstracts 53, 20348e (November 10, 1959)

4.92 NUTRITIONAL EVALUATION OF SOME HEATED OILS

Alfin-Slater, Roslyn B.; Auerbach, Sheila; and Aftergood, Lilla (University of Southern California, Los Angeles)
Journal of the American Oil Chemists' Society 36, 638-641 (December 1959)

Soybean oil, cottonseed oil, and lard were heated under vacuum for 70 and 100 minutes at 610° F. and were fed to male and female rats at a level of 15 percent in the diet over a complete life span. No evidence of impaired nutrition or harmfulness to the test animals was observed in any group except in those fed the more highly polymerized soybean oil. In this group, a decrease in iodine value of 10 percent and a 100 percent increase in viscosity was associated with a slight depression in growth and with reduced reproductive performance in the female animal. This interference with the reproductive process was alleviated by supplementation with α-tocopherol. There was no evidence of increased tumor incidence in the groups ingesting the heated oils. Digestibility of the heated soybean and cottonseed oils was only slightly reduced.

4.92 TOXICITY OF FISH OIL POLYMERIZED BY HEATING IN THE AIR

Matsuo, Noboru (Tokyo Med. Coll.)
Eiyo to Shokuryo 10, 255-9 (1957-58)
Chemical Abstracts 53, 11551g (June 25, 1959)

INDEX

Subject	Page No.	Card No.
Analysis, organic		
Bacteriological evaluation of protein	15	7.51
Antioxidants		
Antioxidant for fish	23	4.61
Antioxidants for frozen trout	23	4.61
Canned fish, containers		
Adhesion of canned salmon meat	21	3.338
Canned fish, processing		
Automatic can handling	7	3.338
Canning frozen sprats	21	3.332
Chemistry and biochemistry, miscellaneous		
Two haemoglobins in chum salmon	1	0.32
Octopus cytochromes	19	0.35
Biochemistry of fishes	19	0.35
Metabolism in fish muscle	19	0.36
Lobster muscle phosphorylase	19	0.36
Phosphorylase in lobster muscle	19	0.36
Lipides in enzyme systems	19	0.38
ATP of perch sperm	19	0.38
Linoleate oxidation by liver extract	19	0.38
Composition, inorganic		
Elements in marine bio-ash	17	8.42
Composition, organic		
Free amino acids of herring	15	8.51
Purine nucleotides of rainbow trout	15	8.59
Amino acids in squid	25	8.51
Mollusk protein fractions	25	8.51
Chlorophyll a in corals	25	8.59
Glycogen in Mytilus edulis	25	8.59
Pteridines in scales of fishes	25	8.59
Dried and dehydrated fish		
Freeze-drying for dehydration	7	3.63
Freeze-drying equipment	9	3.61
Economics and statistics		
Fish for school lunch	17	9.2
Fish meal, nutritive value		
Maryland broiler trial	11	6.190
Organic chick growth factors	11	6.193
Menhaden meal and solubles	13	6.195
Fish meal for broilers	15	6.190
Nutritive value of herring meal	25	6.195
Fish meal and oil, manufacture		
Screening fish meal	13	6.132
Value of herring-meal protein	25	6.195
Fishery biology and fish culture		
Oyster farming	17	9.16
Metabolism of fish	25	9.13
Fish metabolism	25	9.13
Fishing methods		
Trolling for mackerel	3	2.1472
Drift net for herring	3	2.1476
Electrofishing	21	2.143
Freshness of fish		
Chemical indices of decomposition	17	8.8
Frozen fish, changes in during freezing and cold storage		
Freezing Louisiana oysters	5	3.2490
Fat hydrolysis vs. toughness	7	3.2495
Frozen fish, processing		
Thawing of frozen fish	5	3.27
Gear, fishing		
Midwater trawl experiments	19	2.1121
Factors affecting trawl-door spread	19	2.1121
Handling fresh fish		
Black spot in shrimp	3	2.15
Marine plant products		
Seaweed for food	13	6.37
Nutrition and medicine, general		
Protein nutrition problems	1	0.7
Changes in food fats	3	0.7
Nutritional value of fish and toxicity		
Shellfish poisoning in New Brunswick	5	2.9
Nutritional value of fishery byproducts other than meal		
Feed formulation	13	6.55
Oils, nutrition		
Metabolism of conjugated fatty acids	9	4.91
Lipids in hypercholesterolemic rats	23	4.91
Dietary fat and cholesterol metabolism	23	4.91
Fats and diabetes	23	4.91
Dietary fat vs. serum cholesterol	23	4.91
Evaluation of heated oils	23	4.92
Fish oil toxicity	23	4.92
Oils, utilization and marketing		
Fish oil in paint	9	4.83
Mineral processing by flotation	11	4.89
Preservatives and sanitation		
Food additives amendment	5	3.10
Effect of preservatives	21	3.12
Preservative for shrimp	21	3.12
Salt fish		
Assay of salt cod brine	9	3.5
Smoked fish		
Smoked fish storage in CO_2	23	3.4
Arsenic-laden wood smoke	23	3.4
Spoilage		
Marine flavobacterium nutrition	1	0.5
Transportation		
Refrigerated transport	7	3.25
Vitamins, miscellaneous		
Isomerization of vitamin A in vivo	11	5.111
Vessels, fishing		
Stern trawling unit	1	2.115

6.195 PROTEIN-ANALYSIS OF SHRIMP WASTE MEAL

Brown, Russel L.
Commercial Fisheries Review 21, 6-8 (February 1959-Supplement)

(Abstract of this article appears under 7.51 page 15 - July 1959)

6.195 PROTEIN VALUE AND AMINO-ACID BALANCE OF CONDENSED HERRING SOLUBLES AND SPONTANEOUSLY HEATED HERRING MEAL CHICK EXPERIMENTS

Laksevela, B. (Herring Oil and Meal Ind. Research Inst., Straumsgrend, Norway)
Chemical Abstracts 53, 15238d (August 25, 1959)

6.195 BIOLOGICAL VALUE OF HERRING-MEAL PROTEIN. URINARY NITROGEN EXCRETION IN RELATION TO PROTEIN CONTENT OF DIET AND FOOD INTAKE

Njaa, L. R. (Norwegian Fisheries Research Inst., Bergen)
Chemical Abstracts 53, 20339d (November 10, 1959)

8.51 STUDIES ON THE PROTEINS OF SHELLFISH IV. ON THE NONHEAT-COAGULABLE FRACTIONS

Baba, Haruo
Bulletin of the Japanese Society of Scientific Fisheries 23, Nos. 7 and 8, 471-475 (1957) (English abstract, figures, and table)

Nonheat-coagulable protein was isolated from muscle extracts of Meretrix meretrix, Mactra sulcataria, and Atrina japonicum, respectively. Paper-electrophoretic analysis revealed that the material consisted of at least three subfractions with different mobilities. The heat-coagulable components of muscle extracted with a buffer solution of low ionic strength (μ = 0.1, pH 7.8) turned noncoagulable when dialyzed for 3 hours. Against the same buffer solution the coagulability of these components changed to a high degree. Noncoagulable matters were found to be of low mobility, whereas the coagulated proteins showed no mobility.

8.51 MUSCLE EXTRACTS OF AQUATIC ANIMALS I. AMINO ACIDS, TRIMETHYLAMINE AND TRIMETHYLAMINE OXIDE IN THE MUSCLE EXTRACTS OF A SQUID, OMMASTREPHES SLOANI PACIFICUS

Konosu, Shoji; Akiyama, Teruko; and Mori, Takajiro
Bulletin of the Japanese Society of Scientific Fisheries 23, No. 9, 561-564 (1958) (English abstract and tables)

II. Amino acids in the muscle extracts of a prawn, Penaeus japonicus. --Ibid. 565-567.

8.59 PTERIDINES IN THE SCALES OF FISHES

Dupont, A. (Univ. Indonesia, Bogor)
Naturwissenschaften 45, 267-8 (1958) (In English)
Chemical Abstracts 53, 591e (January 10, 1959)

Alcohol-dried fish scales of local Indonesian fishes were ground with sand, freed from fat by Me_2CO extraction, and extracted twice with 5 milliliters N NH_4OH for 24 hours. An equal volume of EtOH was added to the extract, and the insoluble material centrifuged off after 24 hours. The supernatant was chromatographed by using 3 percent NH_4Cl or BuOH : 5N AcOH = 2 : 1 and the spots visualized in ultraviolet light. Data are presented for a variety of fish.

8.59 COLORIMETRIC DETERMINATION OF THE GLYCOGEN IN MYTILUS EDULIS

Rial, Jose Ramon Besada, and Molins, Lorenzo Rodriguez
Bol. inst. espan. oceanog. No. 85, 10 pp. (1957)
Chemical Abstracts 53, 7445e (April 25, 1959)

8.59 CHLOROPHYLL a IN SOME CORALS AND MARINE PLANTS

Burkholder, Paul R. and Burkholder, Lillian M. (Brooklyn Botanic Garden, Brooklyn 25, N. Y.); and Rivero, Juan A. (University of Puerto Rico, Institute of Marine Biology, Mayaguez, Puerto Rico)
Nature 183, 1338-1339 (May 9, 1959)

High chlorophyll values were found in gorgonian corals and in Condylactis. Seven species of plants showed chlorophyll a contents greater than the maximum observed in any of the animals.

9.13 INTERMEDIARY METABOLISM OF FISHES AND OTHER AQUATIC ANIMALS

Gumbmann, M.; Brown, W. Duane; and Tappel, A. L.
Special Scientific Report: Fisheries No. 288, 51 pp. (June 1959) (U. S. Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.)

This paper is a review of current knowledge of intermediary metabolism in fish (teleosts and elasmobranchs), shellfish (mollusks and crustaceans), and certain other aquatic animals. All important research relative to the topic is mentioned, although the paper is not a totally exhaustive review. Numerous references to the original literature are included.

The review is organized around the major well-known metabolic divisions: carbohydrate metabolism, including pathways of glycolysis and the phenomenon of rigor mortis; respiratory metabolism and the tricarboxylic acid cycle; electron transport systems; phosphorus metabolism; protein metabolism; and lipid metabolism. A section concerning the needs for research is included, and specific suggestions for needed investigations are given.

9.13 A METHOD FOR MEASURING THE OXYGEN CONSUMPTION OF FISH

Fromm, Paul O. (Michigan State Univ., E. Lansing)
Chemical Abstracts 53, 20211f (November 10, 1959)

United States
Department of the Interior
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington 25, D. C.

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